36064

REMEDIAL SITE ASSESSMENT DECISION - EPA REGION IV

Site Name: Memphis Airport Storage Area **EPA ID#:** TND 980728034

Alias Site Names: _____

City: Memphis **County or Parish:** Shelby **State:** TN

Refer to Report Dated: 09/30/93 **Report type:** SIP

Report developed by: Halliburton NUS for B&V

DECISION:

|X| **1. Further Remedial Site Assessment under CERCLA (Superfund) is not required because:**

|X| 1a. Site does not qualify for further remedial site assessment under CERCLA (Site Evaluation Accomplished - SEA)

| | 1b. Site may qualify for further action, but is deferred to: | | RCRA | | NRC

| | **2. Further Assessment Needed Under CERCLA:** 2a. (optional) Priority: | | Higher | | Lower

2b. Activity Type: | | PA | | SI | | ESI | | HRS evaluation

| | Other: _____

DISCUSSION/RATIONALE:

Historical source documentation indicates that the quantity of hazardous materials stored on site does not warrant further evaluation of the site at this time.

Report Reviewed and Approved by: David G. Williams Signature: _____ Date: 9/30/93

Site Decision Made by: David G. Williams Signature: _____ Date: 09/30/93

EPA Form # 9100-3

B&V WASTE SCIENCE AND TECHNOLOGY CORP.
1117 Perimeter Center West, Suite W-212, Atlanta, Georgia 30338, (404) 392-9227, Fax: (404) 392-9289

USEPA
Site Inspection Prioritization
Work Assignment No. 12

BVWST Project 52012.106
September 17, 1993

Approved 9/30/93

Mr. Narindar Kumar
Acting Chief, Site Assessment Section
U.S. Environmental Protection Agency
345 Courtland St., NE
Atlanta, GA 30365

Subject: Final Site Inspection
Prioritization
Memphis Airport Storage Area
Memphis, Shelby County, Tennessee
EPA ID No. TND980728034

Dear Mr. Kumar:

Enclosed please find three copies of the Final Site Inspection Prioritization for the Memphis Airport Storage Area site, located in Memphis, Shelby County, Tennessee.

Please feel free to contact me if you have any questions or comments.

Very truly yours,

B&V WASTE SCIENCE AND TECHNOLOGY CORP.

Jancie S. Hatcher

Jancie S. Hatcher
Project Scientist

Enclosures

cc: Doug Thompson, EPA Project Officer, w/ enclosures
Debbie Davidson, EPA Contracting Specialist, w/ enclosures
Hubert Wieland, BVWST, w/o enclosures

FINAL

Site Inspection Prioritization Report

Memphis Airport Storage Area
Memphis, Shelby County, Tennessee
EPA ID No. TND980728034
WasteLAN No. 03958

Prepared Under
Contract No. 68-W9-0055
For The
U.S. Environmental Protection Agency

Prepared By:
Halliburton NUS for B&V Waste
Science & Technology, Corp.
BVWST Project No. 52012.106

SEPTEMBER 15, 1993

Prepared By	Reviewed By	Approved By
Roger Franklin	Jancie S. Hatcher	Hubert Wieland
HNUS Site Manager	BVWST Technical Reviewer	BVWST Project Manager

FINAL
SITE INSPECTION PRIORITIZATION
REPORT
MEMPHIS AIRPORT STORAGE AREA
MEMPHIS, SHELBY COUNTY, TENNESSEE

TABLE OF CONTENTS

LIST OF FIGURES

SITE ASSESSMENT
Final Site Inspection Prioritization
Memphis Airport Storage Area
Memphis, Shelby County, Tennessee
EPA ID No. TND980728034
WasteLAN No. 03958

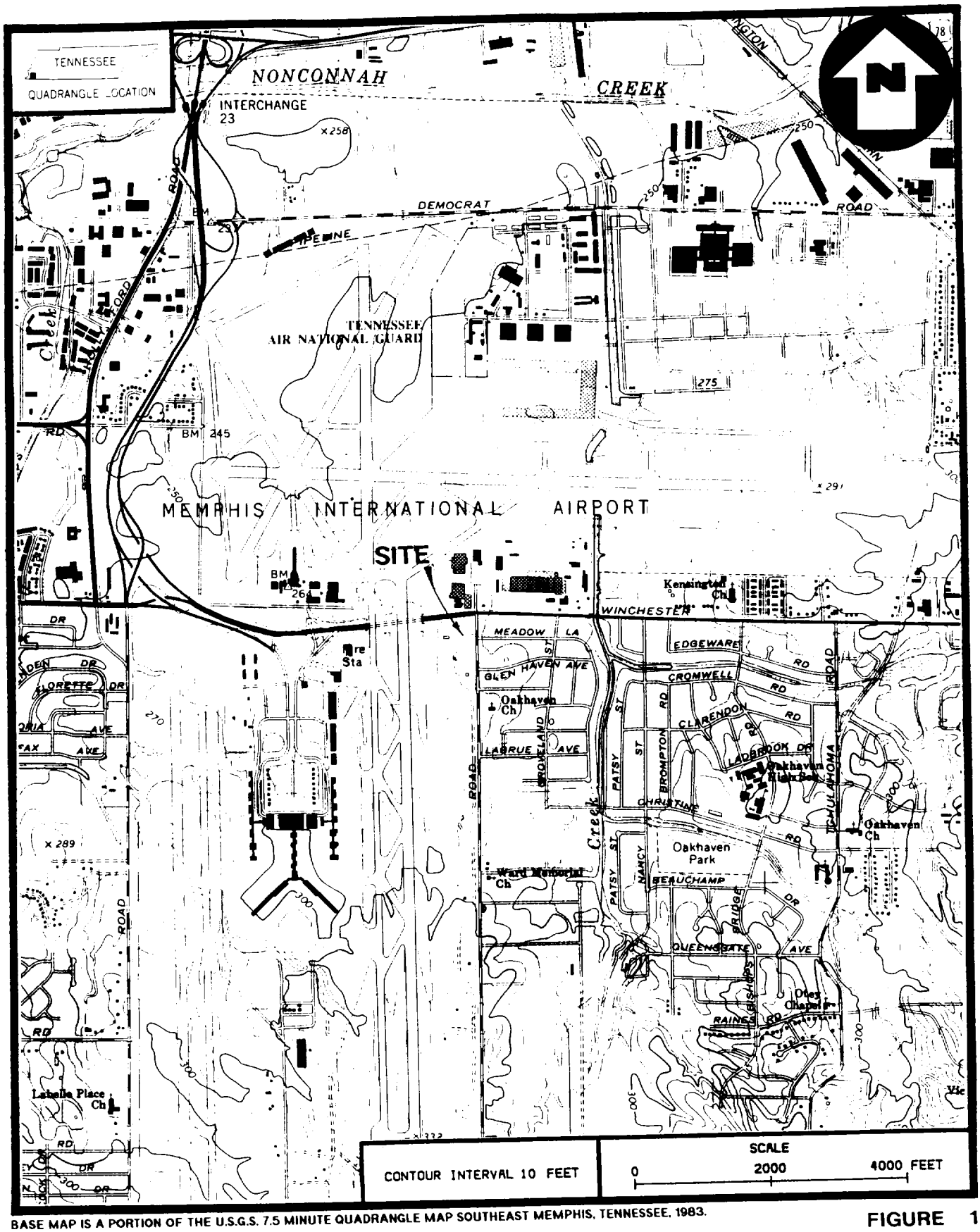
1.0 Introduction

Halliburton NUS was tasked by B & V Waste Science and Technology Corporation under U.S. EPA Contract No. 68-W9-0055 to conduct a Site Inspection Prioritization (SIP) for Memphis Airport Storage Area in Memphis, Shelby County, Tennessee. This study was performed under the authorization of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments Reauthorization Act of 1986 (SARA).

The SIP will update the Preliminary Assessment (PA) for Memphis Airport Storage Area conducted by the Tennessee Department of Health and Environment (TDHE), Division of Solid Waste Management, presently named Tennessee Department of Environment and Conservation (TDEC), by utilizing the Hazard Ranking System (HRS). Additionally, an offsite reconnaissance was performed by Halliburton NUS Corporation on January 14, 1993 to obtain updated site-specific information. Other sources of information used during the evaluation include U.S. EPA CERCLA file material and available state information from the Memphis Superfund Office. The SIP will quantify the threats posed by the site and provide sufficient documentation in order to decide on the appropriate future course of action.

2.0 Site Description and History

The Memphis Airport Storage Area is located in the southwest corner of the intersection of Winchester and Swinnea roads in Memphis, Shelby County, Tennessee (Figure 1). The 0.5-acre site lies on airport property adjacent to the easternmost runway and is owned by the Shelby County Airport Authority (Refs. 1, p. 1; 2). The site is depicted on the Southeast Memphis, Tennessee, U.S. Geological Survey 7.5 Quadrangle at coordinates 35° 03' 06.0" N latitude and 89° 58' 26.0" W longitude (Ref. 3). The site is currently active; however, the years of operation are unknown (Refs. 1, p. 1; 4, p. 4).



BASE MAP IS A PORTION OF THE U.S.G.S. 7.5 MINUTE QUADRANGLE MAP SOUTHEAST MEMPHIS, TENNESSEE, 1983.

FIGURE 1

SITE LOCATION MAP

MEMPHIS AIRPORT STORAGE AREA
MEMPHIS, SHELBY COUNTY, TENNESSEE

HALLIBURTON NUS
Environmental Corporation

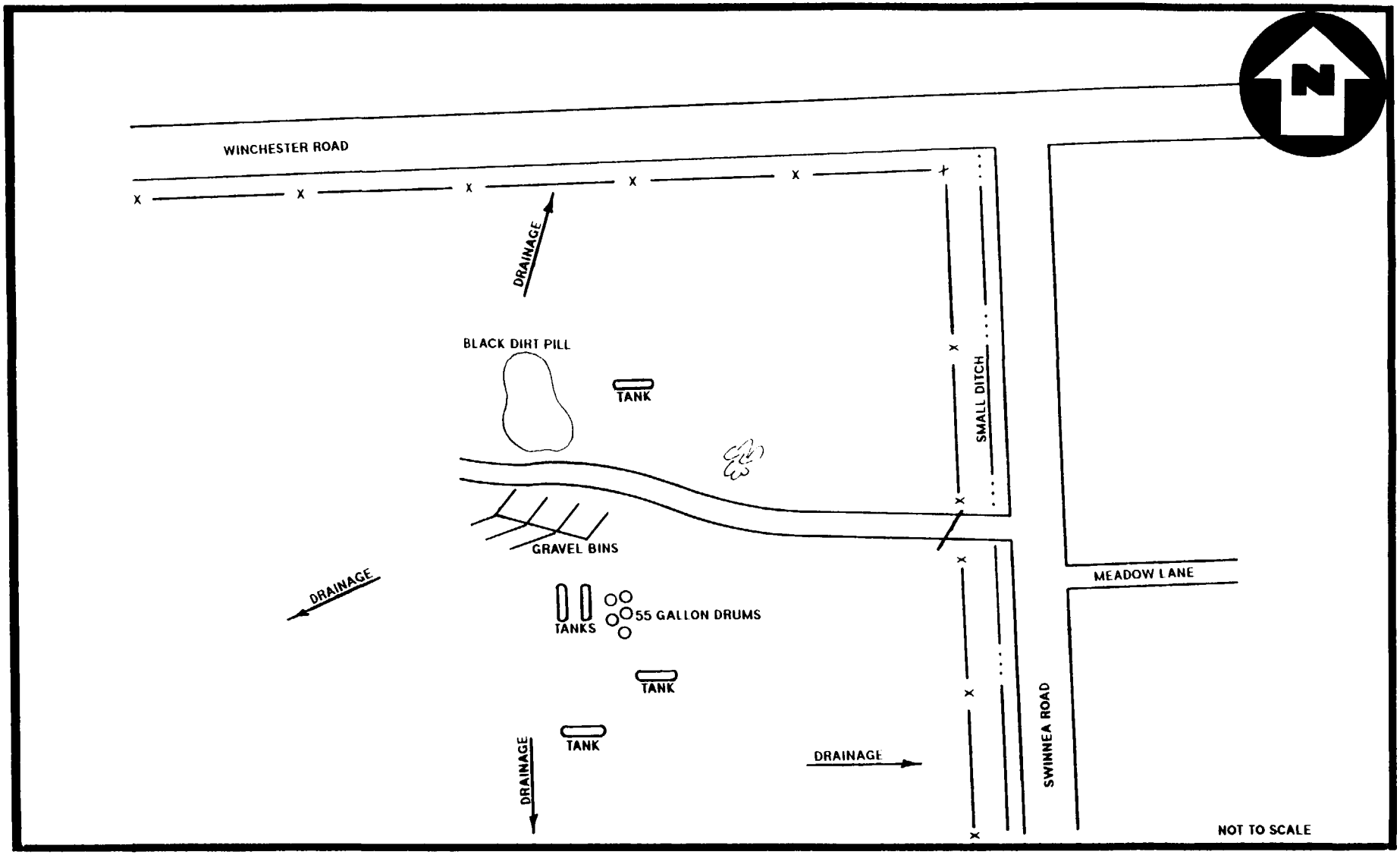


FIGURE 2

SITE LAYOUT MAP

MEMPHIS AIRPORT STORAGE AREA
MEMPHIS, SHELBY COUNTY, TENNESSEE

HALLIBURTON NUS
Environmental Corporation

The average annual precipitation for Memphis is 50 inches, and the mean annual lake pan evaporation is 40 inches, yielding a net annual precipitation of 10 inches (Ref. 5, pp. 43, 63). The 2-year, 24-hour rainfall for the area is 4 inches (Ref. 6, p. 95).

The Memphis Airport Storage Area was identified by aerial photography during the Environmental Photographic Interpretation Center (EPIC) survey conducted by the U.S. Environmental Protection Agency. The aerial photos were examined by EPIC, and the storage area was identified as being a potential hazardous waste site (Ref. 2).

On June 6, 1984, Barry Brawley and Tom Golden of the Tennessee Department of Health and Environment conducted a site inspection of the storage area (Ref. 2, p. 1). They were accompanied by Chuck Graves, Supervisor for Air Field Maintenance for Memphis Airport (Ref. 2, p. 1). At the time of the inspection, the site consisted of an open area where various maintenance materials were stored, including drums of fuel, motor oil, and deicing compounds (Ref. 1, p. 1). Stained soil around the drums, which were stored both on pallets and on the ground, was noted (Ref. 2, p. 1).

Presently, the area is used to store maintenance material (various sizes of gravel), scrap metal, drums, and storage tanks (Ref. 4, p. 5). The site is fenced and guarded by airport security. Access to the site is through a gate along a paved road that bisects the site (Ref. 4, p. 5).

3.0 Groundwater Pathway

3.1 Hydrogeologic Setting

The Memphis Airport Storage Area is situated near the border between the Gulf Coastal Plain and the Mississippi Alluvial Plain physiographic provinces. The Gulf Coastal Plain is characterized by gently rolling to steep topography which is dissected by flat-lying alluvial plains along streams which drain the region. The Mississippi Alluvial Plain is characterized by flat, low-lying regions near the Mississippi River (Ref. 7, p. 5). The site lies 1.5 miles south of Nonconnah Creek and 11 miles east of the Mississippi River. The land surface in the vicinity of the site is 270 feet above mean sea level (amsl) (Ref. 3).

The Memphis area is located in the north-central portion of the Mississippi embayment, a broad structural trough or syncline that plunges south along an axis that parallels the Mississippi River (Ref. 7, p. 6). About 3,000 feet of unconsolidated clastic debris has been deposited since the beginning of the Cretaceous Period (Refs. 7, p. 6; 8, p. 1). Geologic formations in the Memphis area dip and thicken westward toward the axis of the syncline. These formations consist predominantly of

clay, silt, sand, and gravel deposited in marine, lagoon, or fluvial environments. During Pleistocene glaciation, the landscape was covered by a thick layer of loess which makes up the present land surface (Ref. 7, p. 6).

The stratigraphy discussed in this section is based on previous investigations, available published cross sections, published well log data, and the Shelby County Soil Survey. This literature indicates that the following units exist, beneath the facility, in descending order: 5 feet of soil, 100 feet of loess and fluvial deposits, 50 feet of the Jackson-Upper Claiborne confining clay unit, 820 feet of the Memphis Sand, 250 feet of the Flour Island confining unit, and 160 feet of the Fort Pillow Sand (Refs. 7, p. 8, Plates 1 & 4, Table 2; 9, Sheet 76, pp. 17, 22). These thicknesses are approximate.

The soil beneath the facility was of the Grenada, Loring, and Memphis association before grading. This land has been graded for development. After grading, the slope is between 1 and 5 percent. The soil is silty in texture and brown in color. The undisturbed Grenada soils are generally well-drained and have formed in areas where the loess is at least 4 feet thick (Ref. 9, p. 22).

The Memphis Airport Storage Area, located on an upland east of the Mississippi River, is directly underlain by loess and fluvial deposits. The Gulf Coastal Plain was blanketed by a 20- to 50-foot-thick deposit of loess during Pleistocene glaciation. Loess consists of wind-blown silt, silty clay, clay, and minor sand. The loess deposits tend to retard downward migration of water which provides recharge to lower units (Ref. 7, pp. 6-8). Pleistocene fluvial deposits generally underlie the loess in upland areas including the area surrounding the facility. The fluvial deposits are older Mississippi River terrace deposits which were deposited in present day uplands and have since been blanketed by a thick layer of loess. Regional fluvial deposits range from 0 to 100 feet in thickness. Thicknesses vary because of the erosional surface at both the top and base of the unit. Fluvial deposits consist primarily of unconsolidated sand, gravel, and minor clay lenses (Ref. 7, p. 7). Quite often, the sand and gravel are cemented with iron oxide that forms thin layers of sandstone or conglomerate in the lower sections of the fluvial unit (Ref. 7, p. 7). The combined fluvial/loess thickness is approximately 100 feet in the vicinity of the facility (Ref. 7, p. 8, Table 2).

The Eocene Jackson-Upper Claiborne clay unit underlies the loess and fluvial deposits. This unit is comprised of the Jackson Formation and the upper part of the Claiborne Group, which includes the Cockfield and Cook Mountain formations (Ref. 7, pp. 6-8). The Jackson Formation generally consists of fine sand or sandy clay. The Cockfield Formation consists of interfingering fine sand, silt, clay, and local lenses of lignite. The Cook Mountain Formation consists of clay and local sand lenses. These formations have been grouped together as the "Jackson-Upper Claiborne unit", and they act as one hydrogeologic confining unit which prevents groundwater in the surficial deposits from migrating

downward into the Memphis Sand (Ref. 7, pp. 6-8). The estimated hydraulic conductivity of the Jackson-Upper Claiborne confining unit is 1.0×10^{-7} to 1.0×10^{-5}cm/sec (Refs. 10, p. 29; 11). The Jackson Formation occurs only beneath the higher hills and ridges in the north Memphis area; therefore, the confining unit consists predominantly of the Cockfield and Cook Mountain formations (Ref. 7, pp. 6-8). Due to lithologic similarities, the Jackson, Cockfield, and Cook Mountain formations cannot be differentiated in the subsurface of the Memphis area including the subsurface beneath the site. The thickness of the Jackson-Upper Claiborne confining unit is variable. In the vicinity of the site, the thickness is approximately 50 feet; however, the unit is discontinuous, thin, and possibly absent in other areas of Memphis (Ref. 7, pp. 6-9, Plate 1).

The Eocene Memphis Sand, also called the "500-foot" sand by some authors, underlies the Jackson-Upper Claiborne confining unit and exists beneath the entire Memphis area. The Memphis Sand consists of a thick body of sand, that includes subordinate lenses of clay, silt, and lignite at various horizons, and ranges in thickness from about 500 to 900 feet. Beneath the facility, the sand is estimated to be approximately 820 feet thick. The Memphis Sand is thickest in the southwest and thins to the northeast. The top of the Memphis Sand unit beneath the facility is approximately 150 feet below land surface (bls) (Ref. 7, Tables 1 & 2).

The Paleocene Flour Island Formation underlies the Memphis Sand. This formation is the uppermost unit of the Wilcox Group and consists primarily of silty clays and sandy silts. The Flour Island Formation acts as a lower confining unit for the Memphis Sand and ranges from 200 to 395 feet thick (Refs. 7, p. 8; 8, pp. 10, 11). In the vicinity of the facility, the Flour Island is approximately 970 feet bls (Ref. 7, p. 8).

The middle sand unit of the Paleocene Wilcox Group, the Fort Pillow Sand, underlies the Flour Island Formation. This sand ranges from fine sandy textures to coarse sand and ranges in thickness from 150 to 300 feet in the Memphis area (Refs. 7, p. 8; 8, p. 10).

Formations beneath the site which are capable of yielding potable water to wells include: the loess and fluvial deposits, the Memphis Sand and the Fort Pillow Sand. The surficial aquifer consists of the saturated portions of the loess and fluvial deposits. The altitude of the water table in the surficial aquifer is about 280 feet amsl, or 40 feet bls (Ref. 7, Plate 2). The estimated hydraulic conductivity of the surficial aquifer ranges from 1.0×10^{-3} to 1.0×10^{-2} cm/sec (Ref. 10, p. 29). In the areas of Memphis, the surficial aquifer is capable of yielding up to 50 gallons per minute (gpm) (Ref. 10, Plate 2). This aquifer is undoubtedly tapped for domestic supplies in rural areas; however, records of these wells do not exist. In Memphis, all residents have access to public supply water (Ref. 12).

The primary source of groundwater in the Memphis area is the Memphis Sand aquifer. The Memphis Sand is confined above by the Jackson-Upper Claiborne and below by the Flour Island confining units. The elevation of the potentiometric surface for the Memphis Sand in the vicinity of the site is approximately 195 feet amsl, or 130 feet bls (Ref. 7, Plate 3). The hydraulic conductivity of the Memphis Sand is about 1.0×10^{-2} cm/sec (Refs. 8, p. 47; 10, p. 29). Recharge to the Memphis Sand aquifer occurs predominantly through infiltration of precipitation in outcrop areas 30 to 60 miles east of Memphis. Seepage from the overlying surficial aquifer and the Mississippi River also contributes to the recharge of the Memphis Sand. Recently, contamination of the Memphis Sand has been detected in the Memphis region (Ref. 7, pp. 34-37).

Underlying the Flour Island Formation is the Fort Pillow Sand. This unit is the second principal aquifer, and it supplies about 10 percent of water used in the Memphis area. Hydraulic conductivity of the Fort Pillow is about 1.0×10^{-2} cm/sec (Ref. 8, p. 47). The Ft. Pillow Sand is not threatened by surface contamination due to its depth and the presence of several substantial confining units between it and the surface.

The U.S. Geological Survey Water Resources Investigation Report 90-4092, Hydrogeology and Preliminary Assessment of the Potential for Contamination of the Memphis Aquifer in the Memphis Area, Tennessee, discusses the hydrogeology of the Memphis area and outlines the Jackson-Upper Claiborne confining unit (Ref. 7, Table 2). The top of the confining unit is indicated beneath the Memphis Airport Storage Area at approximately 100 feet bls with a thickness of approximately 50 feet (Ref. 7, Table 2). Parks (1990) states that in the Memphis region, the Jackson-Upper Claiborne confining unit is locally thin and locally absent and may contain sand windows that could provide pathways for contaminants to reach the Memphis Sand aquifer. The nearest known zone where the confining unit is thin or absent is approximately 0.5 mile to the northeast (Ref. 7, Plate 4). Evidence which documents the downward migration of groundwater from the surficial water-table aquifer to the Memphis Sand aquifer includes (Ref. 7, pp. 1, 2, 34-37):

- Confining layer absence (locally)
- Hydraulic head differences between the water-table aquifer and the Memphis Sand aquifer
- Local water table surface depressions
- Long-term declines and reduced seasonal fluctuations in water-table observation wells

- Carbon-14 and tritium concentrations present in the Memphis Sand aquifer indicating recent leakage occurring

- Water-quality anomalies in the Memphis Sand aquifer indicating downward leakage

- Volatile organic compounds present in the Memphis Sand aquifer

The site lies within the radius of influence of the Allen Wellfield wells, which pump water from the Memphis Sand (Refs. 3, 13, 14). Heavy pumping of the wellfield has caused a large cone of depression in the Memphis Sand aquifer (Ref. 7, Plates 1, 3). Therefore, any contamination that may occur in the surficial aquifer, beneath the facility, could be drawn into the Memphis Sand aquifer and eventually into the associated water supply wells provided that a hydraulic connection between the surficial and Memphis Sand aquifers exists.

Volatile organic compounds have been detected in samples from the Allen Wellfield, approximately 3.1 miles northwest of the facility, which indicates that the Memphis Sand aquifer is vulnerable to contamination. The migration pathway for the contaminants has not been established. Local absence of the Jackson-Upper Claiborne confining unit and improperly cased wells are the most likely conduits (Ref. 7, pp. 34-37).

3.2 Groundwater Pathway Targets

Groundwater is the sole source for drinking water in the Memphis area and is provided by the Memphis Light, Gas, and Water Division (MLGW), a blended municipal water system (Refs. 13, 14). The system has 206,652 connections serving approximately 547,628 people (number of connections x 2.65 persons per household) (Refs. 13, p. 1; 15). The Allen Wellfield, the only MLGW wellfield located within a 4-mile radius of the site, has 26 wells screened in the Memphis Sand and serves approximately 88,436 people (Refs. 3; 13; 14, pp. 4, 6, 7; 15). However, wellfields in the MLGW system may potentially serve more than the listed number of persons because the entire system is blended. The Allen Wellfield has 12 wells, serving 40,812 people within 3 to 4 miles northwest of the site. An Allen Wellfield well located 3.1 miles from the site is the closest known drinking water well (Refs. 3; 14, pp. 6, 7). The exact number of private wells in the area is unknown (Refs. 12, 14). However, all residents within a 4-mile radius of the site have access to municipal drinking water (Ref. 12).

4.0 Surface Water Pathway

4.1 Hydrologic Setting

The site is situated on a slight topographic rise; therefore, surface runoff would flow in all directions away from the site (Ref. 2, p. 8). The closest surface water body is Hurricane Creek located approximately 2,500 feet to the east (Ref. 3). Hurricane Creek is an intermittent stream which flows north 1.5 miles into Nonconnah Creek (Refs. 3; 16, p. 1). Nonconnah Creek flows west at an average flowrate of 107 cubic feet per second (cfs) for a distance of 7 miles to Lake McKellar (Refs. 3; 17, p. 10). Lake McKellar extends 5 miles from the Nonconnah Creek outfall to the Mississippi River (Ref. 3). The 15-mile pathway is completed along the Mississippi River 1.5 miles downstream of the mouth of Lake McKellar (Ref. 3). The Mississippi River has a flowrate of 580,000 cfs (Ref. 17). There is no flowrate information available for Lake McKellar (Ref. 17).

4.2 Surface Water Targets

There are no drinking water intakes nor irrigation intakes along the extended surface water pathway (Refs. 18, 19). Based on information from wetland maps from the Tennessee Wildlife Resources Agency, there are an estimated 10 miles of wetland frontage identified along the surface water pathway (Refs. 3, 20). There are no other sensitive environments or endangered or threatened species identified along the surface water pathway (Refs. 3, 21). The Memphis Airport Storage Area is not located within any flood plain area (Ref. 22).

Although commercial fishing has not occurred in the Mississippi River or its tributaries since 1985, due to a fishing ban imposed by the Tennessee Wildlife Resources Agency, recreational fishing still takes place despite posted warnings (Refs. 23, 24). The official fishing ban on the Mississippi River is for the Tennessee side of the river only, as Arkansas has not participated in the ban. Thus, commercial fishing may occur on the Arkansas side of the Mississippi River (Ref. 23). The state of Mississippi has never had a ban on commercial fishing, nor does it post any warning signs (Ref. 25). In addition, Nonconnah Creek and the Mississippi River are utilized for recreational activities such as boating, swimming, and water skiing (Ref. 24).

5.0 Soil Exposure and Air Pathways

5.1 Physical Conditions

The Memphis Airport Storage Area lies within a moderately populated area surrounded by light industry (Ref. 4, p. 6). The site is active; therefore, the individuals most threatened by exposure are airport maintenance workers (Ref. 4, p. 4). The site is surrounded by a chain-link fence and is guarded by airport security (Ref. 2, p. 8). The terrain surrounding the site is level and consists of streets, runways, and manicured grass. Land use within the vicinity of the site is primarily commercial and light industrial (Ref. 4, p. 6).

5.2 Soil and Air Targets

There are approximately 526 people located within 0.25 to 0.5 mile of the site, 2,049 people located within 0.5 to 1 mile of the site, 23,507 people located within 1 to 2 miles of the site, 36,942 people located within 2 to 3 miles of the site, and 78,076 people located within 3 to 4 miles of the site. This corresponds to a total population of approximately 141,094 within a 4-mile radius of the site (Ref. 26). The property within 0.25 mile of the site is owned by the Memphis Airport Authority and not used as a residential area (Ref. 4, p. 6). Additionally, there are no sensitive environments or endangered or threatened species within a 4-mile radius of the site (Refs. 3, 21).

6.0 Conclusions and Recommendations

The Memphis Airport Storage Area was evaluated to assess the threat posed to human health and the environment and to determine the need for additional investigation. The groundwater pathway was of some concern due to the presence of local areas where the Jackson-Upper Claiborne confining unit is thin or absent and because there are a total of 12 public water supply wells within a 4-mile radius of the site. The surface water pathway is of minimal concern due to the lack of targets. There are no intakes along the 15-mile pathway and very little potential for contamination of surface water bodies used for recreation.

There is some potential for soil pathway exposure because the site is active, thus placing onsite workers at risk. The air pathway is of minimal concern due to lack of targets and sensitive environments. Based on the information evaluated in this study of Memphis Airport Storage Area, it is recommended that no further action be taken for the site.

REFERENCES

1. Tennessee Department of Health and Environment, Potential Hazardous Waste Site Preliminary Assessment for Memphis Airport Storage Area. Filed by Michael Higgs, January 11, 1984.

2. Tennessee Department of Health and Environment, Site Inspection Report for Memphis Airport Storage Area. Filed by Barry Brawley, September 25, 1984.

3. U.S. Geological Survey, 7.5 minute series Topographic Quadrangle Maps of Tennessee: Southwest Memphis 1965 (photorevised 1973), Southeast Memphis 1965 (PR 1983), Horn Lake, Miss-Tenn 1982, Pleasant Hill, Miss-Tenn 1982, scale 1:24,000.

4. Halliburton NUS Corporation Field Logbook No. A0040 for Memphis Airport Storage Area, Documentation for Field Reconnaissance, January 14, 1993.

5. U.S. Department of Commerce, Climatic Atlas of the United States (Washington, D.C., GPO, 1983).

6. U.S. Department of Commerce, Rainfall Frequency Atlas of the United States, Technical Paper Number 40 (Washington, D.C., GPO, 1961).

7. William S. Parks, Hydrogeology and Preliminary Assessment of the Potential for Contamination of the Memphis Aquifer in the Memphis Area, Tennessee, U.S. Geological Survey Water Resources Investigations Report 90-4092 (Memphis, Tennessee, 1990).

8. J.H. Criner, P-C.P. Sun, and D.J. Nyman, Hydrology of Aquifer Systems in the Memphis Area, Tennessee, U.S. Geological Survey Water Supply Paper 1779 (Memphis, Tennessee, 1964).

9. U.S. Department of Agriculture, Soil Survey Shelby County,Tennessee, revised February 1989, pp. 17, 22, Sheet 76.

10 Cherry, John A. and Freeze, R. Allen, Groundwater (Englewood Cliffs, N.J.: Prentice Hall, 1979).

11. Dr. William S. Parks, telephone conversation with Carter Helm, BVWST, March 3, 1992. Subject: Site-specific geology and confining layer information.

12. Barry Moore, Shelby County Health Department, telephone conversation with Jancie Hatcher, BVWST, October 21, 1991. Subject: Memphis area private wells.

13. James Webb, Manager, Memphis Light, Gas, and Water Division, letter to Robert Morris, Environmental Engineer, U.S. Environmental Protection Agency, November 20, 1990. Subject: The number of connections served by Memphis Light, Gas, and Water Division.

14. Fred Von Hofe, Water Research Engineer, Memphis Light, Gas, and Water Division, letter to Charlie Stevens, U.S. Environmental Protection Agency, November 5, 1990. Subject: Memphis Light, Gas, and Water Division water production 1990.

15. U.S. Department of Commerce, Proof Copy of table generated for 1990, CPH-1: Summary Population and Housing Characteristics, issued by Bureau of Census (April 1991).

16. Halliburton NUS Corporation Field Logbook No. A0033 for Jackson Pit Dump, Documentation for Field Reconnaissance, January 12, 1993.

17. Dewey L. Jones, Department of the Army, Memphis District, Corps of Engineers, letter and attachments to Laura J. Morrisson, BVWST, April 1, 1992. Subject: Discharge data for rivers in the Memphis area.

18. Jerry Collins, Department of Memphis Public Works, telephone conversation with Laura Morrisson, BVWST, October 18, 1991. Subject: Surface water intakes on the Mississippi River.

19. Troy Taylor, Shelby County Soil Conversation Service, telephone conversation with Jancie Hatcher, BVWST, February 7, 1992. Subject: Irrigation areas in Shelby County.

20. Tennessee Wildlife Resources Agency, Shelby County Wetlands Map, 1991.

21. Tennessee Department of Conservation, Division of Ecological Services, List of Rare and Endangered Species, computer database printout keyed to U.S. Geological Survey 7.5 minute topographic quadrangles: Southwest Memphis and Fletcher Lake. Printout date December 16, 1992.

22. Federal Emergency Management Agency (FEMA), National Flood Insurance Program, Flood Insurance Rate Map, community-panel number 470177 0080 C, City of Memphis, Tennessee, revised date August 19, 1985.

23. John Condor, Wildlife Resources Agency, telephone conversation with Laura Morrisson, BVWST, December 23, 1991. Subject: Recreational fishing on the Mississippi River.

24. John Rayfield, Tennessee Wildlife Resource Agency, Shelby County office, telephone conversation with Paul Delphos, BVWST, July 1, 1992. Subject: Fishing and recreation on Memphis area water bodies.

25. Ron Garovelli, Chief of Fisheries, Mississippi Wildlife and Fisheries, telephone conversation with Laura Morrisson, BVWST, February 11, 1992. Subject: Fishing ban on the Mississippi River.

26. U.S. Environmental Protection Agency, Graphical Exposure Modeling System (GEMS) Data Base. Compiled from U.S. Bureau of the Census data (1980).

CONFIDENTIAL
HAZARD RANKING SYSTEM PRELIMINARY SCORE
FOR
MEMPHIS AIRPORT STORAGE AREA
MEMPHIS, SHELBY COUNTY, TENNESSEE

This preliminary score was calculated using PA-SCORE software. All four pathways are evaluated.

The following score reflects a waste characteristics score of 18, as the area of suspected contaminated soil is 0.5 acre. There is no available analytical data for the site; thus, the source area cannot be more closely defined. The site is used for storage of airport maintenance material and scrap metal. Drums containing fuel oil and deicing solutions were stored there at one time.

The groundwater pathway is the primary pathway of concern due to the proximity of the facility to the Allen Wellfield, which is one of the 10 wellfields that supply potable water to the entire city of Memphis. The groundwater pathway was evaluated with the Memphis Sand as the aquifer of concern, due to the presence of local areas where the Jackson-Upper Claiborne confining unit is thin or absent. The soil beneath the facility is assumed to be nonkarst. There are a total of approximately 40,812 people using groundwater from the 12 Allen Wellfield wells located within 4 miles of the facility.

The surface water pathway is of minimal concern. Drainage from the site flows more than 2,500 feet before entering the Hurricane Creek which flows into Nonconnah Creek. There are no drinking water intakes nor irrigation intakes along the surface water pathway, and the site is located outside the 500-year flood plain. Nonconnah Creek and the Mississippi River were identified as fisheries, but with flowrates greater than 1,000 cubic feet per second. There are an estimated 10 miles of wetland frontage along the surface water pathway, but no other sensitive environments are present.

The soil exposure and air pathways are also of lesser concern, since the site is securely fenced and guarded by airport security. Any potential for worker exposure is minimal, since the area is open and only occasionally used. There are no residents within 200 feet of the facility, and an estimated 526 people located within 0.25 mile. Population within 1 mile of the facility is estimated at 4,624, and population within 4 miles is approximately 144,044. There are no sensitive environments within 4 miles of the site.

Due to the relatively few targets associated with the site and the distance of the municipal wells from the site, no further action is recommended for Memphis Airport Storage Area.

S_{gw} = 46

S_{sw} = 3

S_{so} = 3

S_a = 6

OVERALL SCORE = 24

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION
01 STATE: TN | 02 SITE NUMBER: TND 980728034

II. SITE NAME AND LOCATION

01 SITE NAME	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
Memphis Airport Storage Area SEA-9	Winchester

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Memphis	TN	38138	Shelby	157	08

09 COORDINATES LATITUDE	LONGITUDE
35 03 04.N	89 58 26.W

10 DIRECTIONS TO SITE (Starting from nearest public road):

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)
Memphis Airport Authority	Winchester

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Memphis	TN	38138	( )

07 OPERATOR (If known and different from owner)	08 STREET (Business, mailing, residential)
SAME	

09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
			( )

13 TYPE OF OWNERSHIP (Check one)
☐ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☒ E. MUNICIPAL
☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☐ A. RCRA 3001 DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☒ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☒ YES DATE 8.19.80 (MONTH DAY YEAR) ☐ NO

02 (Check all that apply)
☒ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)
CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)	03 YEARS OF OPERATION
☒ A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN	BEGINNING YEAR _____ ENDING YEAR _____ ☒ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED
Runway deicers, fuel, tar, ect.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
This is a storage Area for various items used in maintenence of Airport facilities. In the 9/19/80 EPA SI Report some spillage was noted. Inspect if time allows. Storage Area - not disposal

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is assigned, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☒ C. LOW (Inspect on a routine basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBER
Chuck Graves	Airfield Mtnce Sup. Mfs Airport Auth.	(901) 345-7777

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
Michael J. Higgs	TN Dept of Health & Env.	Division of Solid Waste Management	(615) 741-6237	1 . 11 . 84 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	TND 980728034

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- ☐ C. SLUDGE
- ☐ D. OTHER _____ (Specify)
- ☐ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS _____

CUBIC YARDS _____

NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- ☐ A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☐ D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ☐ H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently used CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
7					

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D980728034

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: _____ (Acres) 04 NARRATIVE DESCRIPTION

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D 980729034

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include names of species)

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills/runoff/standing liquids/leaking drums) — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

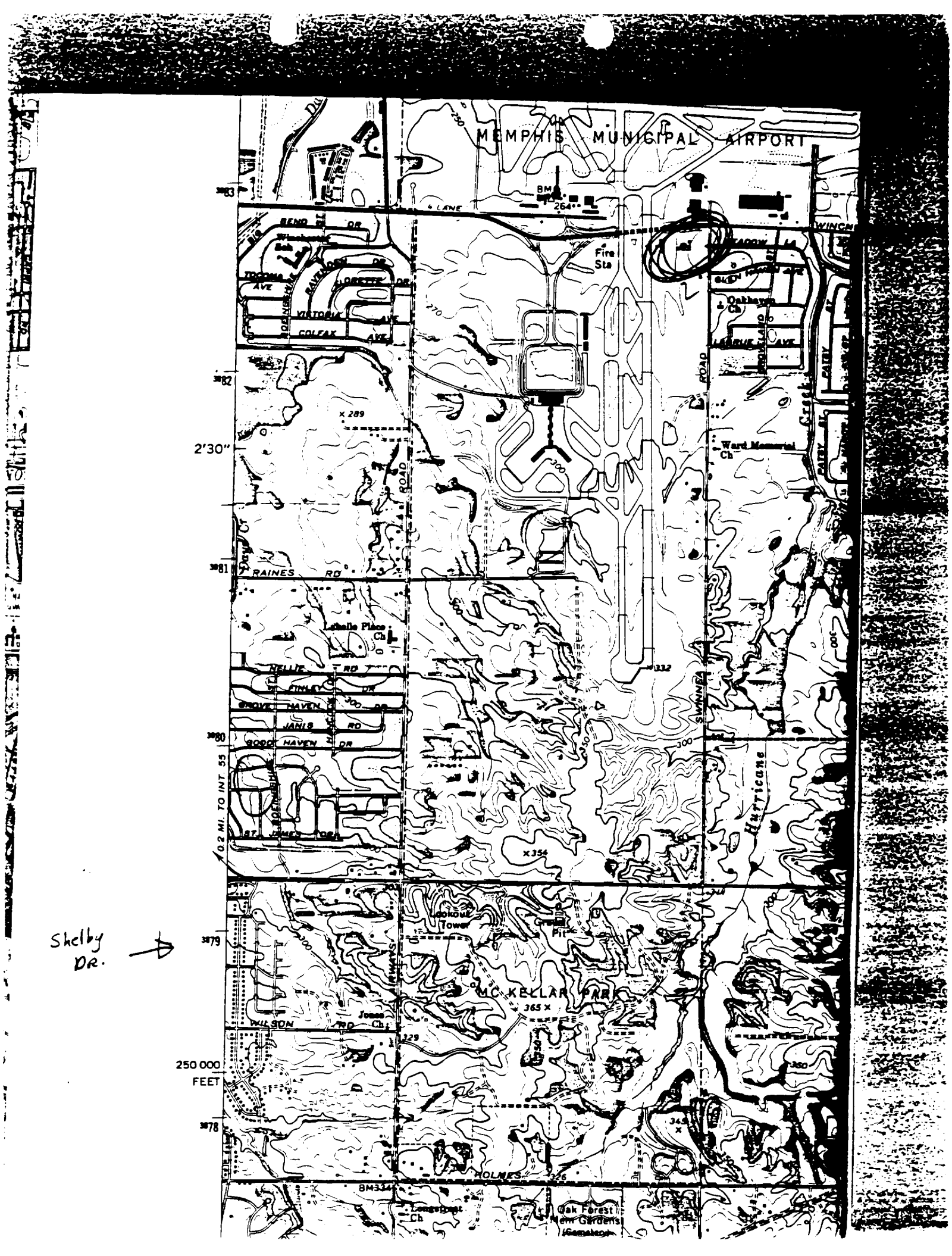
01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e. g., state files, sample analysis, reports)


MEMPHIS MUNICIPAL AIRPORT
BM 264
Fire Sta
Oakhaven Ch
Ward Memorial Ch
Lichelle Place Ch
Lookout Tower
Fit
MC KELLAR PARK
Jones Ch
Lonestar Ch
Oak Forest Mem Gardens
Cemetery
BM334
RAINES RD
WILSON RD
HOLMES
ELVIS PRESLEY BLVD
Hurricane
Creek
3883
3882
3881
3880
3879
3878
2'30"
250 000 FEET
0.2 MI. TO INT. 55
Shelby Dr.

REFERENCE 2

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

OFFICE CORRESPONDENCE

FROM	TO	DATE

DATE: *September 25, 1984*

TO: *The Files*

FROM: *W. Barry Brawley*

SUBJECT: *§3012 Program - Site Investigations*
Memphis Airport Storage Area SEL-9
Memphis, TN.
TND 980728034

MEMPHIS AIRPORT STORAGE AREA
SEL-9

On June 6,1984, Barry Brawley and Tom Golden of The Tennessee Department of Health and Environment, §3012 Program visited the Memphis Airport Storage Area, designated SEL-9 by the EPA's EPIC Survey. Mr. Chuck Graves, Air Field Maintenance Supervisor, allowed access to the site and answered questions.

The Memphis Airport Storage Area was identified by an aerial survey conducted by the EPA known as the EPIC survey. This site was disignated SEL-9. The site consists of an open field area adjacent to the airport's runways where various numbers of drums are stored. The drums contain substances used in the maintenance and upkeep of the runways. All drums are stored on pallets or directly on the ground. According to Mr. Graves, no land disposal has ever occurred at this site; however, very small amounts of ground stain were observed around the drums. Mr. Graves was advised to contact the Memphis Field Office of the Division of Solid Waste Management for current regulations regarding this situation.

FROM	DATE

TO

Based on the facts that this site is used only for storage of raw materials and no land disposal has occurred, there is NO FURTHER ACTION required by the §3012 Program.

WBB/tad

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

EPA

I. IDENTIFICATION
01 STATE: TN | 02 SITE NUMBER: TND980728034

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
Memphis Airport Storage Area SEL-9	Winchester Rd

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Memphis	TN	38138	Shelby	157	08

09 COORDINATES: LATITUDE 35 02 04 | LONGITUDE 89 58 26

10 TYPE OF OWNERSHIP (Check one)
☐ A. PRIVATE ☐ B. FEDERAL _____ ☐ C. STATE ☐ D. COUNTY ☒ E. MUNICIPAL
☐ F. OTHER _____ ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION	02 SITE STATUS	03 YEARS OF OPERATION
6 6 84 (MONTH DAY YEAR)	☒ ACTIVE ☐ INACTIVE	_____ BEGINNING YEAR _____ ENDING YEAR ☒ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR _____ (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR _____ (Name of firm)
☒ E. STATE ☐ F. STATE CONTRACTOR _____ (Name of firm) ☐ G. OTHER _____ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
Barry Brawley	Geologist	TN Dept. of H & E	(615) 741-6287
09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO.
Tom Golden	Engineer	TN Dept. of H & E	(615) 741-6287
			( )
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
Chuck Graves	Maintenance Supervisor	Memphis Airport Auth.	(901) 345-7777
			( )
			( )
			( )
			( )
			( )

NO FURTHER ACTION

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☒ PERMISSION ☐ WARRANT	9:20 am	Cloudy, 78°

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency Organization)	03 TELEPHONE NO.
Chuck Graves	Memphis Airport Authority	(901) 345-7777

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
Barry Brawley	TN Dept. of H & E	Div. of Swm	615-741-6287	9 25 84 (MONTH DAY YEAR)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D980735034

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- ☐ C. SLUDGE
- ☐ D. OTHER _____ (Specify)
- ☐ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE
(Measures of waste quantities must be independent)

TONS _____

CUBIC YARDS _____

NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- ☐ A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☐ D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ☐ H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., State files, sample analysis reports)

EPA FORM 2070-13(7-81)

N/A

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D980728034

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ A. GROUNDWATER CONTAMINATION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 ☐ B. SURFACE WATER CONTAMINATION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 ☐ C. CONTAMINATION OF AIR
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 ☐ E. DIRECT CONTACT
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 ☐ F. CONTAMINATION OF SOIL
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: _____ (Acres)
04 NARRATIVE DESCRIPTION

01 ☐ G. DRINKING WATER CONTAMINATION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 ☐ H. WORKER EXPOSURE/INJURY
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 ☐ I. POPULATION EXPOSURE/INJURY
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

N/A

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: TN | 02 SITE NUMBER: TND980728034

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include names of species)

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills/Runoff/Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D980728034

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A. NPDES				
☐ B. UIC				
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☐ A. SURFACE IMPOUNDMENT		
☐ B. PILES		
☒ C. DRUMS, ABOVE GROUND	Varys	
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
☐ F. LANDFILL		
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ I. OTHER (Specify)		

04 TREATMENT (Check all that apply)

- ☐ A. INCINERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER (Specify)

05 OTHER

☒ A. BUILDINGS ON SITE

06 AREA OF SITE

0,5 (Acres)

07 COMMENTS

Above-ground storage of drums containing materials used in the maintenance and upkeep of runways

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☒ B. MODERATE ☐ C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

Drums on pallets or bare ground; some spillage. Mr. Graves was advised to check with Memphis Field office of Div. of Solid Waste regarding current regulations pertaining to storage

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE ☐ YES ☒ NO

02 COMMENTS

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

Site visit

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D980725034

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)			02 STATUS			03 DISTANCE TO SITE
	SURFACE	WELL	ENDANGERED	AFFECTED	MONITORED	
COMMUNITY	A. ☐	B. ☒	A. ☐	B. ☐	C. ☐	A. _____ (mi)
NON-COMMUNITY	C. ☐	D. ☒	D. ☐	E. ☐	F. ☐	B. _____ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING ☒ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available) ☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available) ☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER _____

03 DISTANCE TO NEAREST DRINKING WATER WELL _____ (mi)

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
_____ (ft)	_____	_____ (ft)	_____ (gpd)	☐ YES ☒ NO

09 DESCRIPTION OF WELLS (Including useage, depth, and location relative to population and buildings)

10 RECHARGE AREA		11 DISCHARGE AREA	
☐ YES ☐ NO	COMMENTS	☐ YES ☒ NO	COMMENTS

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☒ A. RESERVOIR, RECREATION DRINKING WATER SOURCE ☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☐ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
None affected	☐	_____ (mi)
	☐	_____ (mi)
	☐	_____ (mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
A. _____ NO OF PERSONS	B. _____ NO OF PERSONS	C. _____ NO OF PERSONS

02 DISTANCE TO NEAREST POPULATION _____ (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE	04 DISTANCE TO NEAREST OFF-SITE BUILDING
_____	_____ (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE: TN | 02 SITE NUMBER: TND980728034

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. $10^{-6} - 10^{-8}$ cm/sec ☐ B. $10^{-4} - 10^{-6}$ cm/sec ☐ C. $10^{-4} - 10^{-3}$ cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one)

☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) ☐ B. RELATIVELY IMPERMEABLE ($10^{-4} - 10^{-6}$ cm/sec) ☐ C. RELATIVELY PERMEABLE ($10^{-2} - 10^{-4}$ cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH	
_____ (ft)	_____ (ft)	_____	

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE		
		SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
_____ (in)	_____ (in)	_____ %		_____ %

09 FLOOD POTENTIAL
SITE IS IN _____ YEAR FLOODPLAIN

10
☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE	OTHER
A. _____ (mi)	B. _____ (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)
_____ (mi)
ENDANGERED SPECIES: _____

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS	
		PRIME AG LAND	AG LAND
A. <1 (mi)	B. ~2 (mi)	C. >10 (mi)	D. _____ (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

Site is located within boundaries of Memphis Airport. Access to site is restricted by fences and guards. Storage area is located on a slight topographic rise adjacent to runways.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Site visit

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D980728034

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER		None taken	
SURFACE WATER			
WASTE			
AIR			
RUNOFF			
SPILL			
SOIL			
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☐ GROUND ☒ AERIAL

02 IN CUSTODY OF EPA - ERIC Survey
(Name of organization or individual)

03 MAPS ☐ YES ☐ NO

04 LOCATION OF MAPS

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

VI. SOURCES OF INFORMATION (Cite specific references e.g., state files, sample analysis, reports)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D980728034

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER		
Memphis Airport Authority			
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE	
Winchester			
05 CITY	06 STATE	07 ZIP CODE	
Memphis	TN	38138	
01 NAME	02 D+B NUMBER		
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE		
05 CITY	06 STATE	07 ZIP CODE	
01 NAME	02 D+B NUMBER		
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE		
05 CITY	06 STATE	07 ZIP CODE	
01 NAME	02 D+B NUMBER		
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE		
05 CITY	06 STATE	07 ZIP CODE	

PARENT COMPANY (If applicable)

08 NAME	09 D+B NUMBER	
10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE	
12 CITY	13 STATE	14 ZIP CODE
08 NAME	09 D+B NUMBER	
10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE	
12 CITY	13 STATE	14 ZIP CODE
08 NAME	09 D+B NUMBER	
10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE	
12 CITY	13 STATE	14 ZIP CODE
08 NAME	09 D+B NUMBER	
10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE	
12 CITY	13 STATE	14 ZIP CODE

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE
01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE
01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE

IV. REALTY OWNER(S) (If applicable, list most recent first)

01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE
01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE
01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D980728034

II. CURRENT OPERATOR *(Provide if different from owner)*

01 NAME	02 D+B NUMBER
Same	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER

OPERATOR'S PARENT COMPANY *(If applicable)*

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

III. PREVIOUS OPERATOR(S) *(List most recent first; provide only if different from owner)*

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

PREVIOUS OPERATORS' PARENT COMPANIES *(If applicable)*

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

IV. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D980728034

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-13 (7-81)

N/A

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D980728034

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ F. WASTE REPACKAGED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ H. ON SITE BURIAL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ L. ENCAPSULATION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ N. CUTOFF WALLS — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

N/A

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D980728034

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ S. CAPPING/COVERING — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ V. BOTTOM SEALED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ W. GAS CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ X. FIRE CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Y. LEACHATE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Z. AREA EVACUATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 2. POPULATION RELOCATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	TND980728034

II. ENFORCEMENT INFORMATION

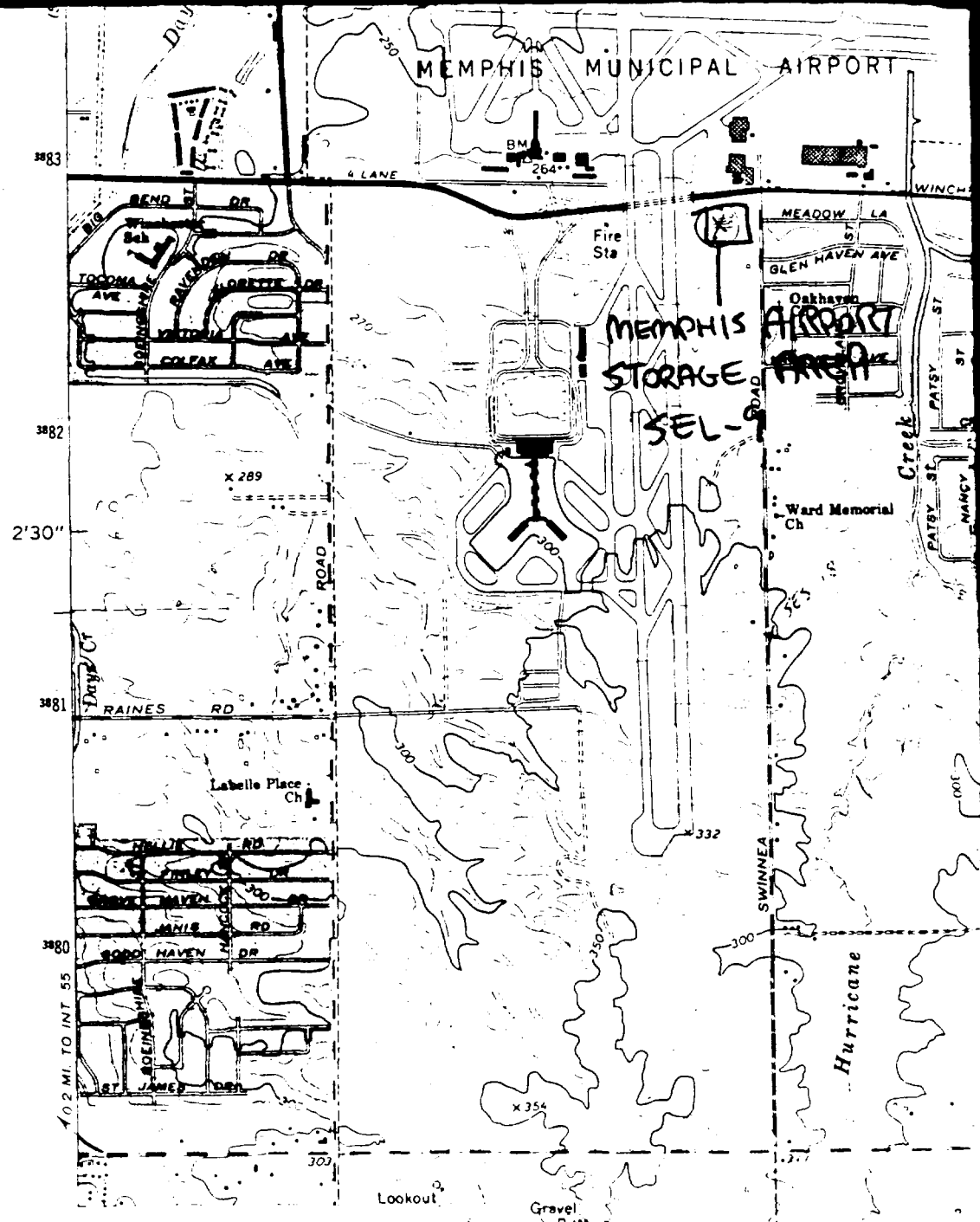
01 PAST REGULATORY/ENFORCEMENT ACTION ☐ YES ☒ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

None

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-13 (7-81)



SOUTHEAST MEMPHIS QUADRANGLE

TENNESSEE – SHELBY CO.

7.5 MINUTE SERIES (TOPOGRAPHIC)

OVERSIZED

DOCUMENT

REFERENCE 4

"Rite in the Rain"®

ALL-WEATHER

LEVEL

Notebook No. 311

A0040

Precision Meter Shop 9P88
PWB Corporation 2T26
Memphis Airport Storage Area 2T27
Shelby Co. Penal Farm 2T28
Memphis, Shelby Co., TN

Observations recorded by Steve Petrides

Precision Motor Works, Inc.
1882 Chelsea Ave.

① Current name
② Site status (active or not)
③ Size of site
④ Note source of contamination
⑤ Any private wells (closed)
⑥ distance to surface water (creek, reservoir)
⑦ Site commercial / residential ?
⑧ # of workers
⑨ Evidence of surficial contamination ?

We the undersigned, understand the work plan for the site.

C Petrides — faxed letter
S. Singleton — I don't [illegible]
R. Franklin — [illegible]

1/13/93 — Could not locate site under this name. (Phone call Victor [illegible])

Chris Peterson 1/13/93

(1)

1/13/93 PRB Corporation

1545 Arrived at site, Location at 901 E. Bodley Street

Plant now known as American Resource Recovery Corporation.

The site was fenced with an electric sliding gate at front entrance

Just south of site is Federal Compress & Warehouse company to the south.

Could not see inside facility to sketch

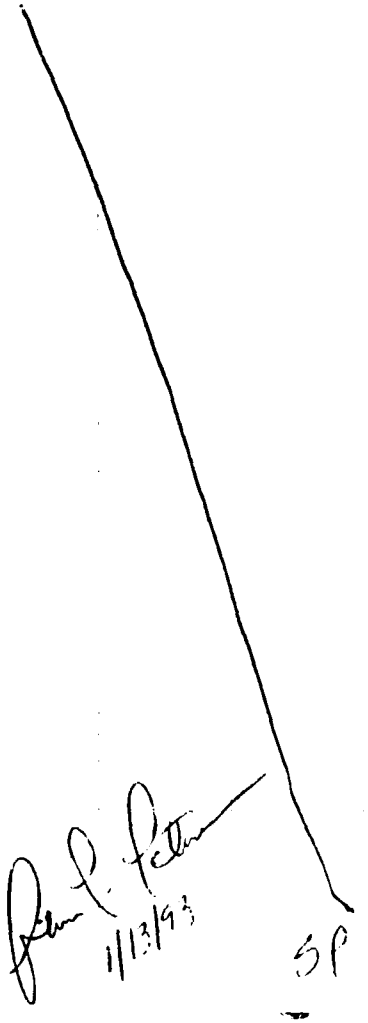
1550 Conducted a house count of the immediate area
Estimated 75 houses within 1/4 mile of site.

SP 1/13/93

(2)

Area is flat with street drainage encouraged toward Cane Creek to the south.

1600 left area



1/13/93

SP 1/13/93

(3)

11/14/93 Hercules Airport Storage Area [1-14-93]

1105 Arrived at site as per given directions. SW corner of intersection Winchester Swinnea across from Medlow Ln entrance. Sunny, Cold, 30°F

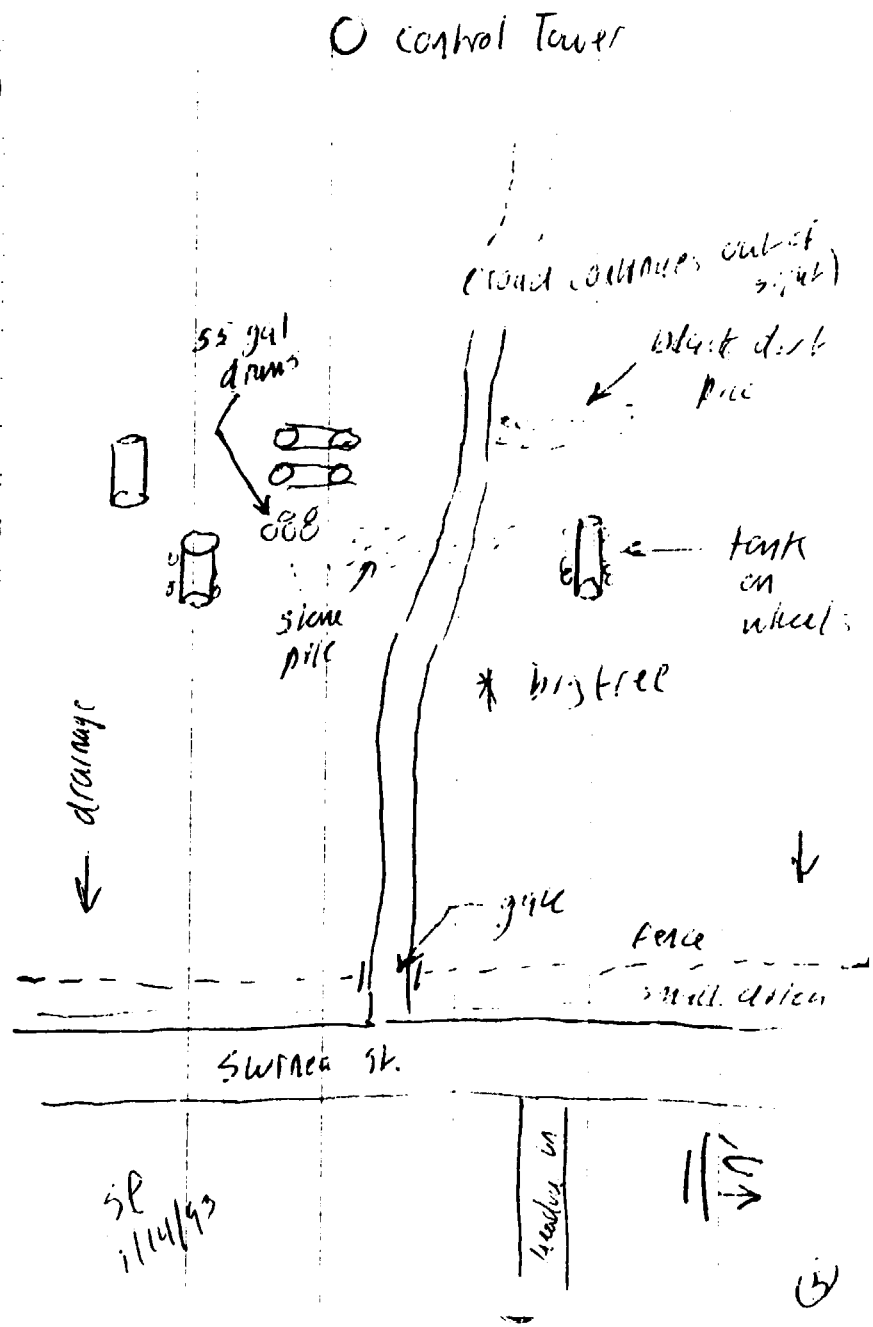
Site is a part of airport key access is from Swinnea Rd. Approximately 1/2 mile East of control tower

Observed 4-5 apparent fuel storage tanks, approximately 1000 gallons apiece, 5-6 55 gal drums

Also piles of stone/gravel The area is grassed over with a backhoe road leading to the tanks

Area is fenced w/ barbwire and a 3 locked gate. One worker opened the gate and proceeded in

SP 1/14/93



Across Sarnea St. is a large "ghost" subdivision. A network of streets, driveways, utilities. Fire hydrants, but no houses.

It is possible that a thriving neighborhood once existed but houses were removed or torn down or development never materialized. Lots of nice old oak trees and conifers in this houseless subdivision

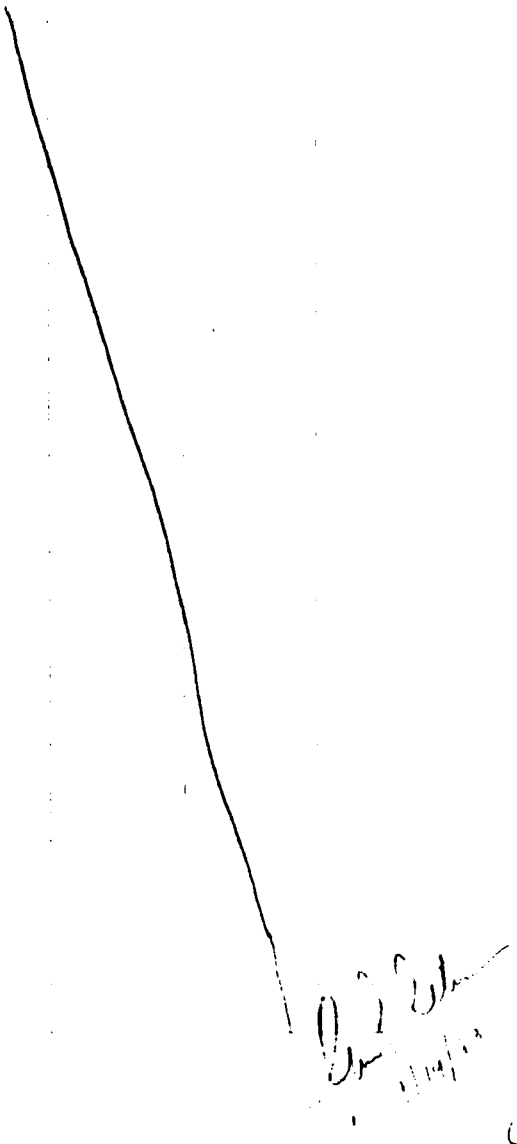
The area is highly residential Military planes in an exact to the north

9:25 Driving south to see if there are any residential areas. 1 mile south: no houses, schools, day cares, etc. 2 miles, no houses etc.

9:30 Left area

SP 1/14/13

blank page



1000 Arrival at Shelby Co. Feed Farm Sunny Cold 30°F

Area is fenced off with an apparent motocross track just in front of mounded area in distance.

The fence is broken at the gate to the motocross track, cycle tracks lead thru opening. However, the apparent land fill area is beyond the MX track.

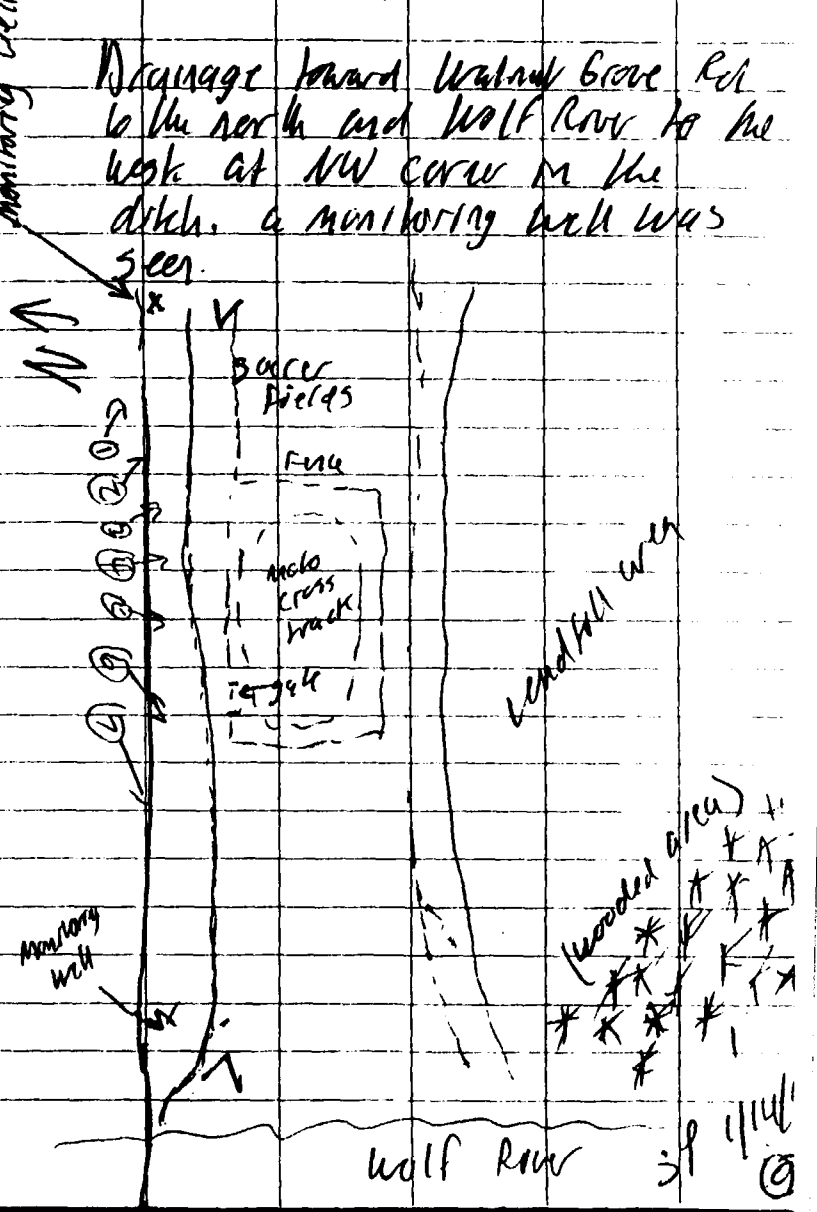
The landfill area from our vantage point appears to be fenced on its own

No stressed vegetation, birds flocking in area

Wolf River at western edge, hiking trails associated at

western end.

Drainage toward Walnut Grove Rd to the north and Wolf River to the west at NW corner of the ditch. a monitoring well was seen.



SP 1/14/93

(8)

SP 1/14/93

(9)

Drainage along small walnut Grove Rd flows westward in ditch toward Wolf River

The Shelby Farms area is expansive area can see for miles to the north and east Some woods but mostly open areas

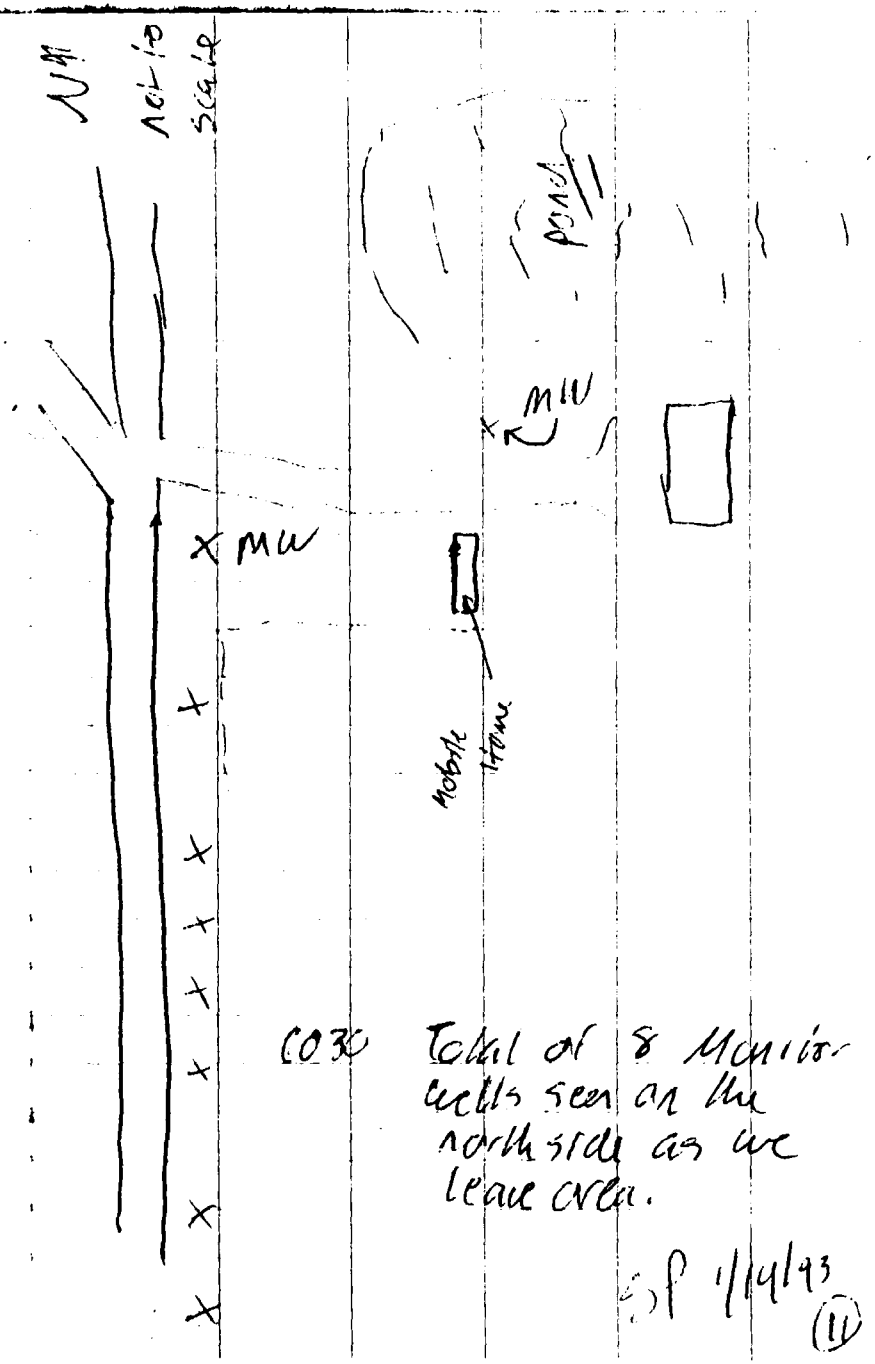
Soccer fields are east of the Mclaccoss track, north of landfill area

0720 Another monitoring well was spotted NE of the landfill. From west to east along service road, distance was 0.5 mile.

East of the landfill, there is a large pond and another monitoring well

SP 1/14/93

(10)



0730 Total of 8 monitor wells seen on the northside as we leave area.

SP 1/14/93

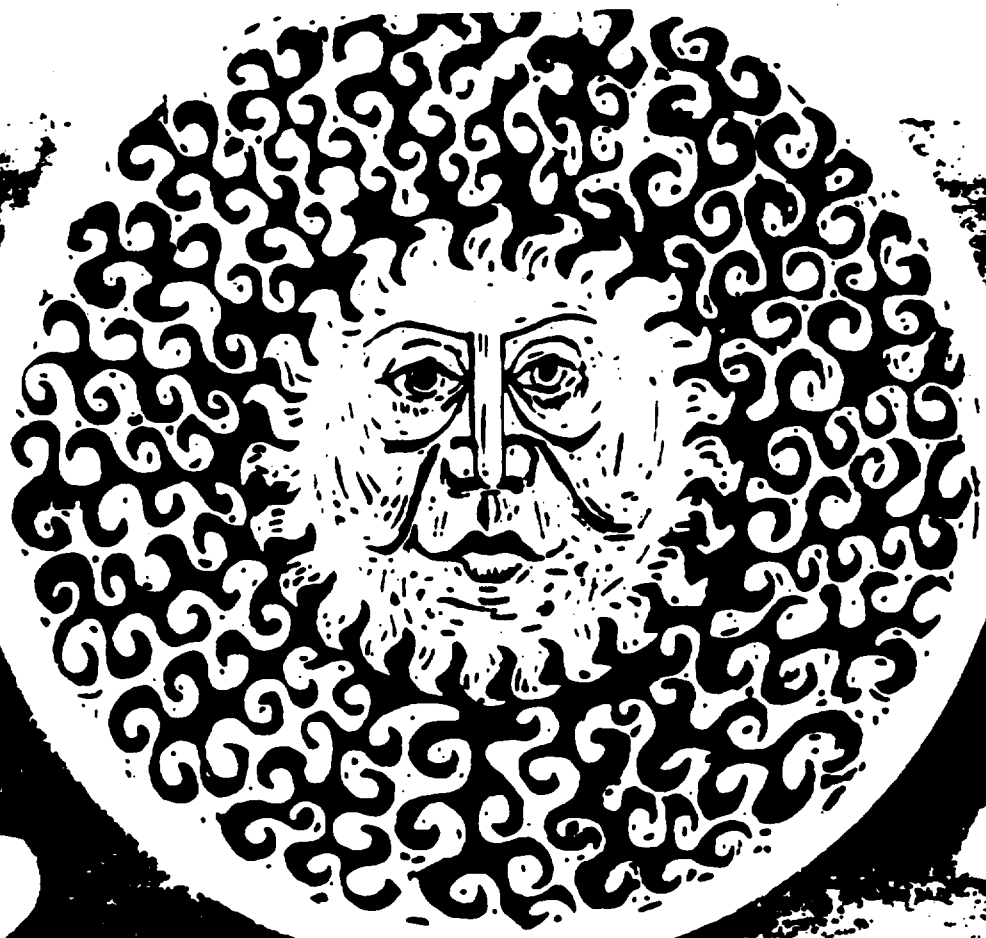
(11)

Inside a gate at eastern end, several cars, trucks parked along w/ cleers & front end loaders but no workers visible.

1025 Garbage truck enters gate suggesting that strike may be active. After watching gate for 10 minutes, only one (1) truck enter

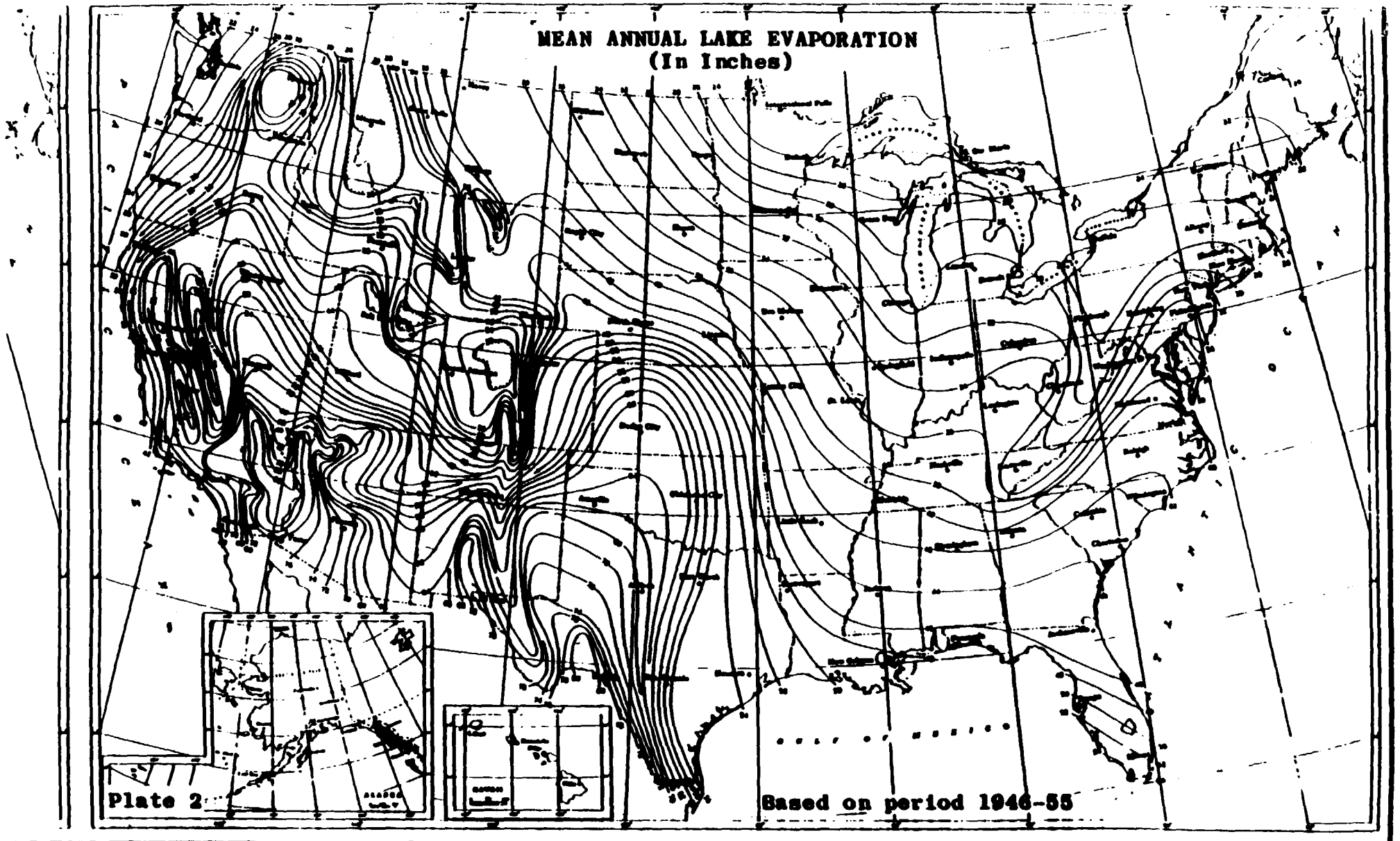
1030 Left site, Scott counts 8 monitoring wells along north side (along Walnut Creek Road

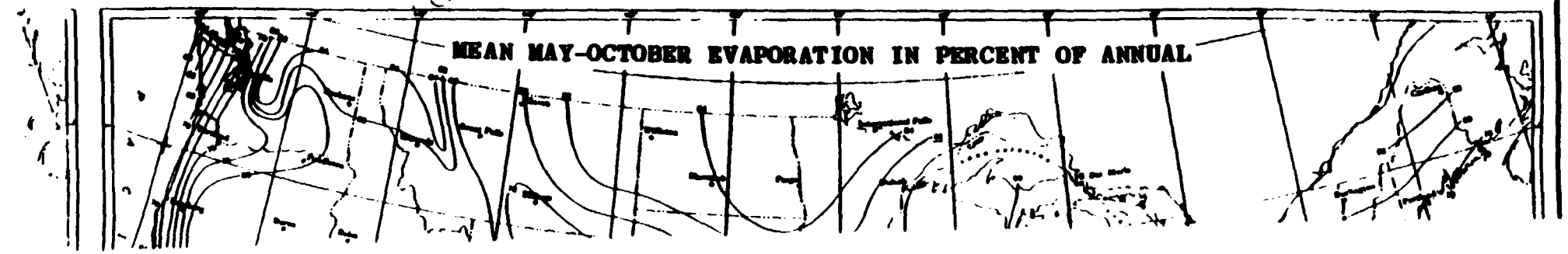
11/14/93



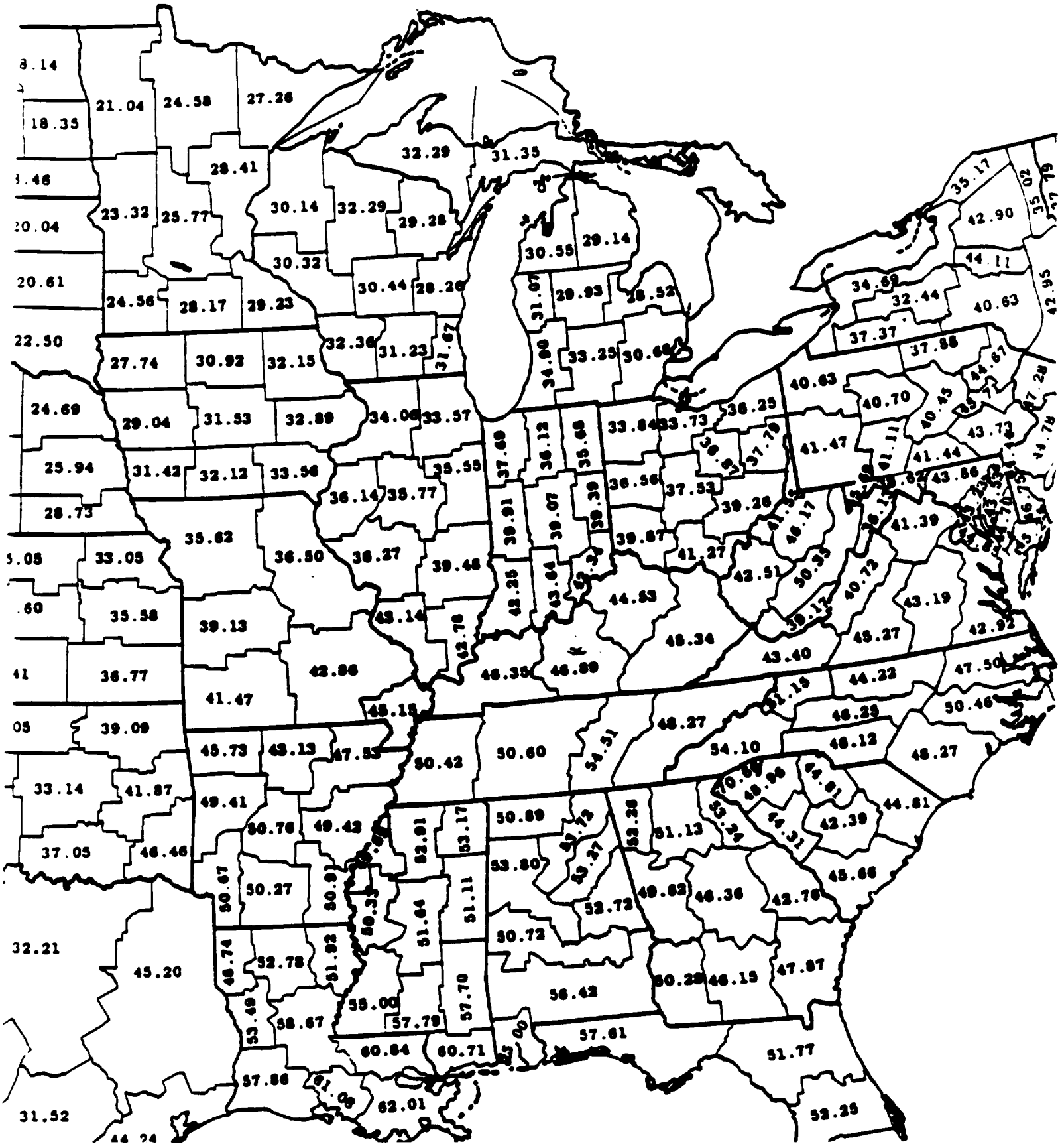
CLIMATIC ATLAS OF THE UNITED STATES

mental Science Services Administration . Environmental Da


MEAN ANNUAL LAKE EVAPORATION
(In Inches)
Plate 2
Based on period 1946-55


MEAN MAY-OCTOBER EVAPORATION IN PERCENT OF ANNUAL

ON (inches) BY STATE CLIMATIC DIVISIONS



DEPARTMENT OF COMMERCE
[illegible] Secretary

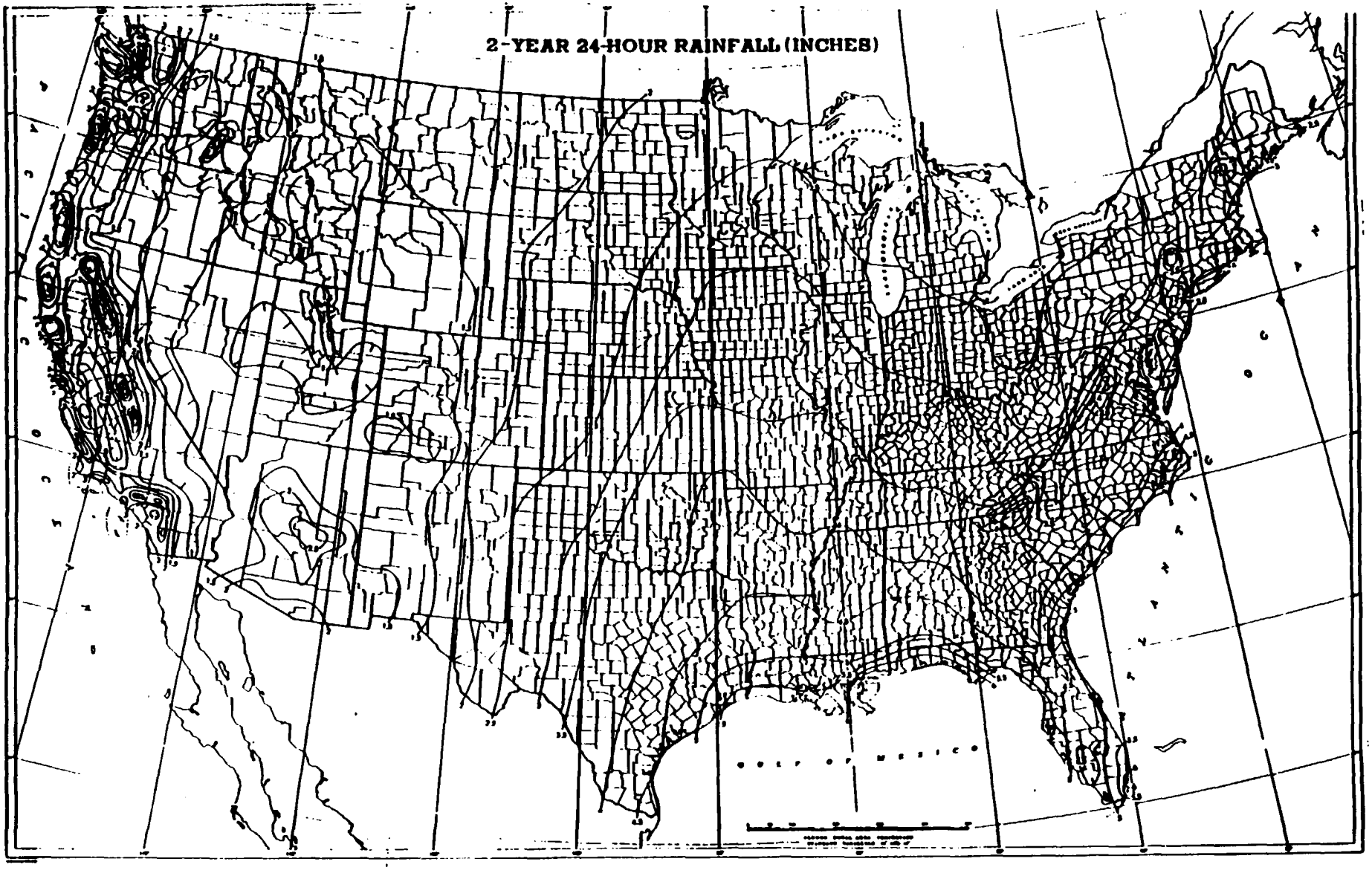
WEATHER BUREAU
F. W. [illegible], Chief

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture


2-YEAR 24-HOUR RAINFALL (INCHES)

REFERENCE 7

HYDROGEOLOGY AND PRELIMINARY ASSESSMENT OF THE POTENTIAL FOR CONTAMINATION OF THE MEMPHIS AQUIFER IN THE MEMPHIS AREA, TENNESSEE

By William S. Parks

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations Report 90-4092

Prepared in cooperation with the
CITY OF MEMPHIS,
MEMPHIS LIGHT, GAS AND WATER DIVISION

Memphis, Tennessee
1990

DEPARTMENT OF THE INTERIOR

MANUEL LUJAN, JR., Secretary

U.S. GEOLOGICAL SURVEY

Dallas L. Peck, Director

For additional information write to:

District Chief
U.S. Geological Survey
A-413 Federal Building
U.S. Courthouse
Nashville, Tennessee 37203

Copies of this report can be purchased from:

U.S. Geological Survey
Books and Open-File Reports Section
Federal Center, Building 810
Box 25425
Denver, Colorado 80225

CONTENTS

PLATES (in pocket)

ILLUSTRATIONS

TABLES

CONVERSION FACTORS AND DEFINITIONS

Factors for converting inch-pound units to metric units are shown to four significant digits:

Multiply inch-pound units	By	To obtain metric units
inch (in.)	2.540	centimeter (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
square mile (mi^2)	2.590	square kilometer (km^2)
million gallons per day (Mgal/d)	0.04381	cubic meter per second (m^3/s)

Sea level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929 (NGVD of 1929)--a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Well-Numbering System: Wells are identified according to the numbering system used by the U.S. Geological Survey (USGS) throughout Tennessee. The well number consists of three parts: (1) an abbreviation of the name of the county in which the well is located; (2) a letter designating the USGS 7 $^1/_2$-minute topographic quadrangle on which the well is plotted; and (3) a number generally indicating the numerical order in which the well was inventoried. The well number Sh:K-141, for example, indicates that the well is located in Shelby County on the "K" quadrangle and is identified as well 141 in the numerical sequence. Quadrangles are lettered from left to right, beginning in the southwest corner of the county. In this report, wells in Crittenden County, Ark., and DeSoto County, Miss., are numbered using the prefixes "Ar:" and "Ms:" for the preparation of illustrations. The suffixes (for example, "A-7") for the wells in DeSoto County are the same as the well designations assigned by the USGS in Mississippi.

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Plate 2

EXPLANATION

DAVIS — MEMPHIS LIGHT, GAS AND WATER DIVISION WELL FIELD

NSST — AREA OF NO SIGNIFICANT SATURATED THICKNESS

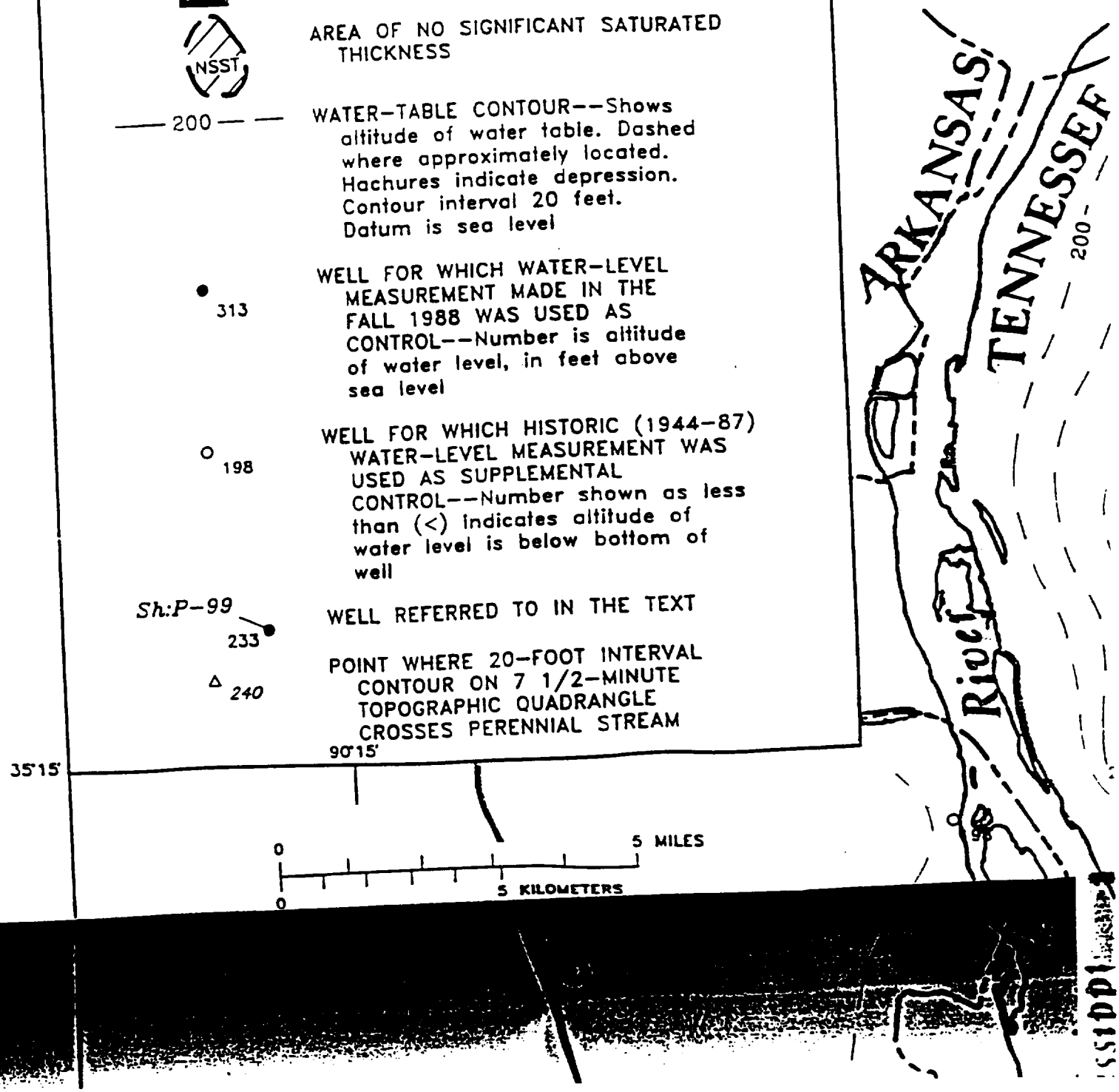
200 — WATER-TABLE CONTOUR--Shows altitude of water table. Dashed where approximately located. Hachures indicate depression. Contour interval 20 feet. Datum is sea level

313 — WELL FOR WHICH WATER-LEVEL MEASUREMENT MADE IN THE FALL 1988 WAS USED AS CONTROL--Number is altitude of water level, in feet above sea level

198 — WELL FOR WHICH HISTORIC (1944-87) WATER-LEVEL MEASUREMENT WAS USED AS SUPPLEMENTAL CONTROL--Number shown as less than (<) indicates altitude of water level is below bottom of well

Sh:P-99 / 233 — WELL REFERRED TO IN THE TEXT

240 — POINT WHERE 20-FOOT INTERVAL CONTOUR ON 7 1/2-MINUTE TOPOGRAPHIC QUADRANGLE CROSSES PERENNIAL STREAM



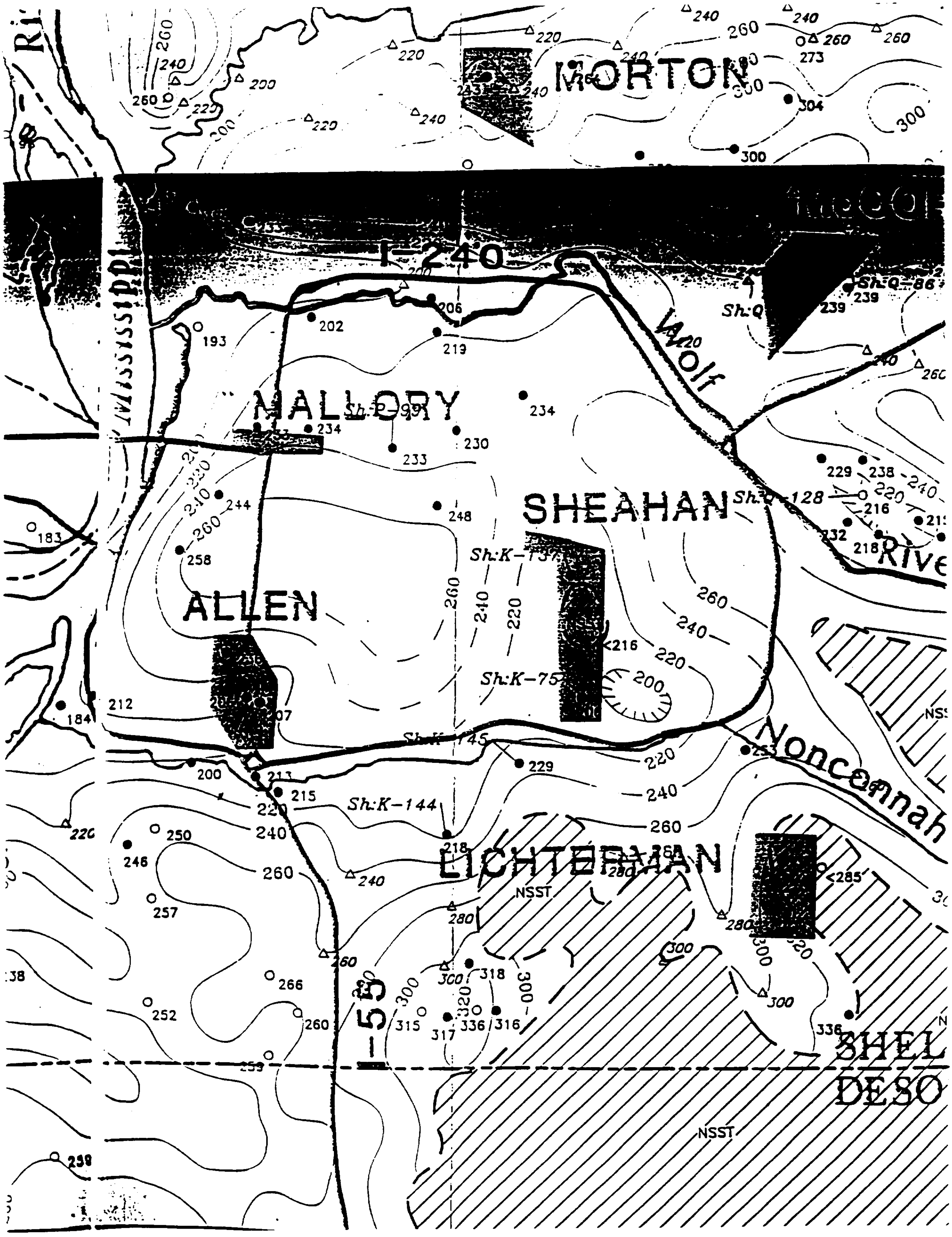
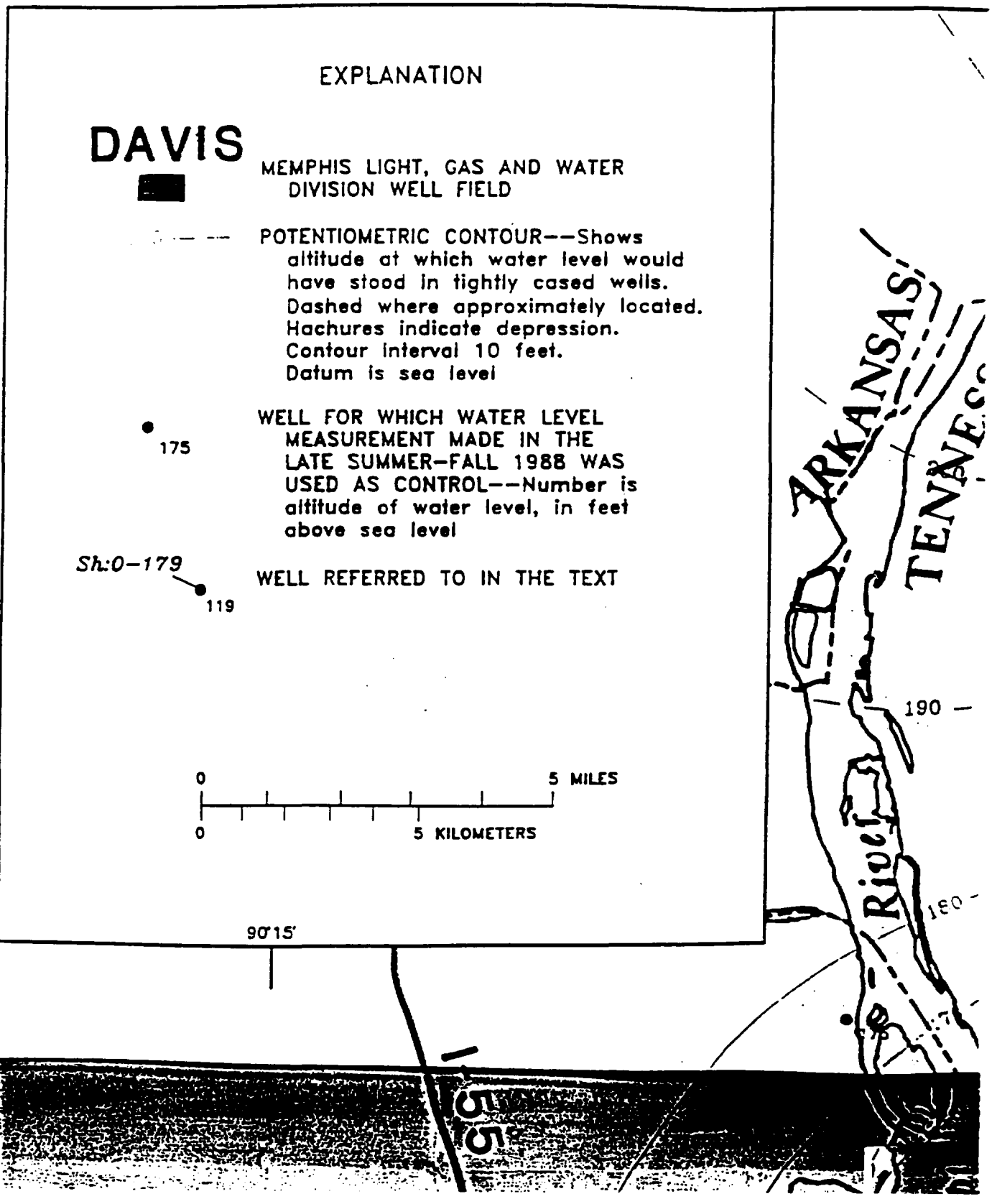

MORTON
I-240
MISSISSIPPI
Wolf
River
MALLORY
SHEAHAN
ALLEN
Nonconnah
LICHTERMAN
I-55
NSST
Sh:Q-86
Sh:Q
Sh:Q-128
Sh:P-99
Sh:K-137
Sh:K-75
Sh:K-145
Sh:K-144

Plate B

MEM-PH

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY



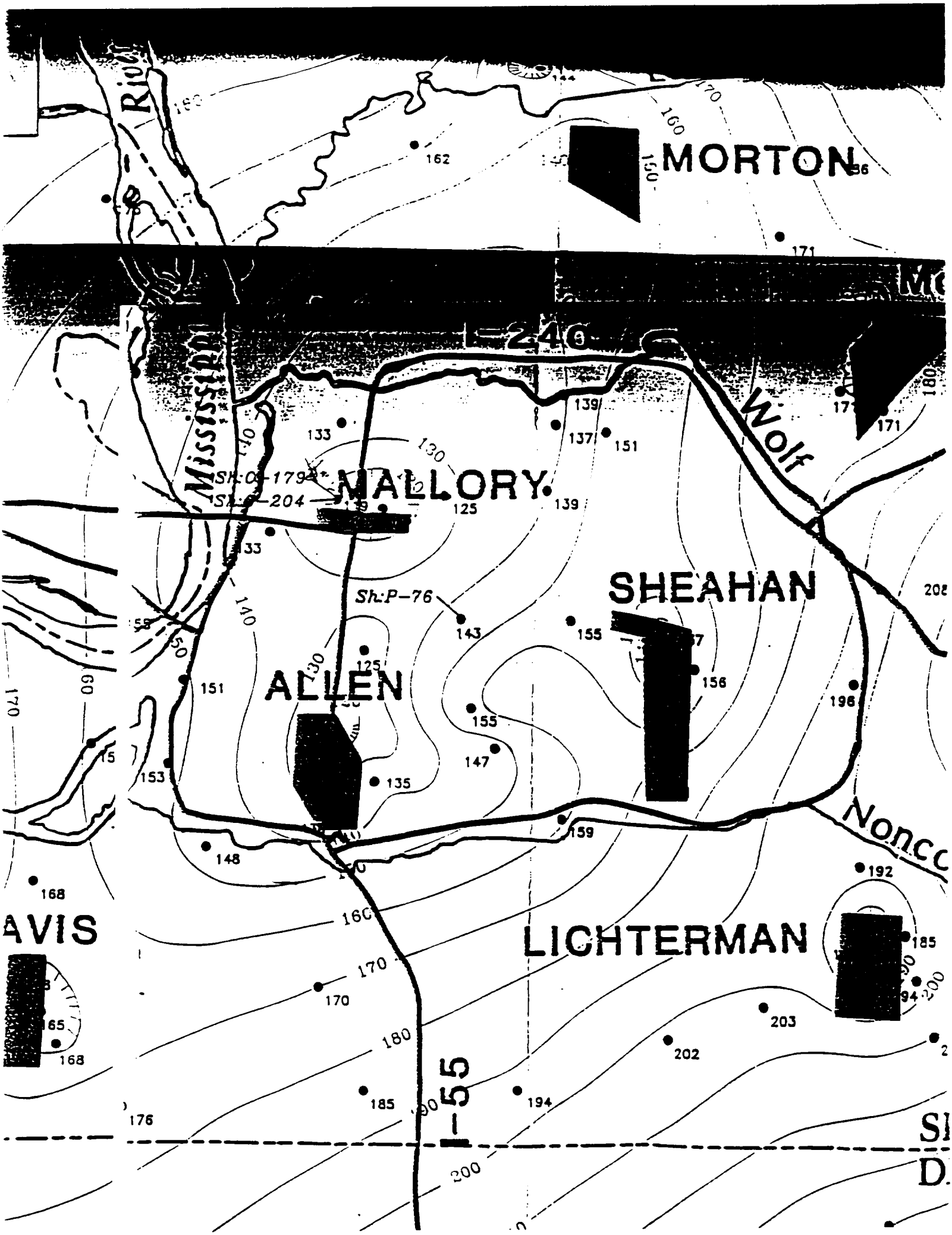
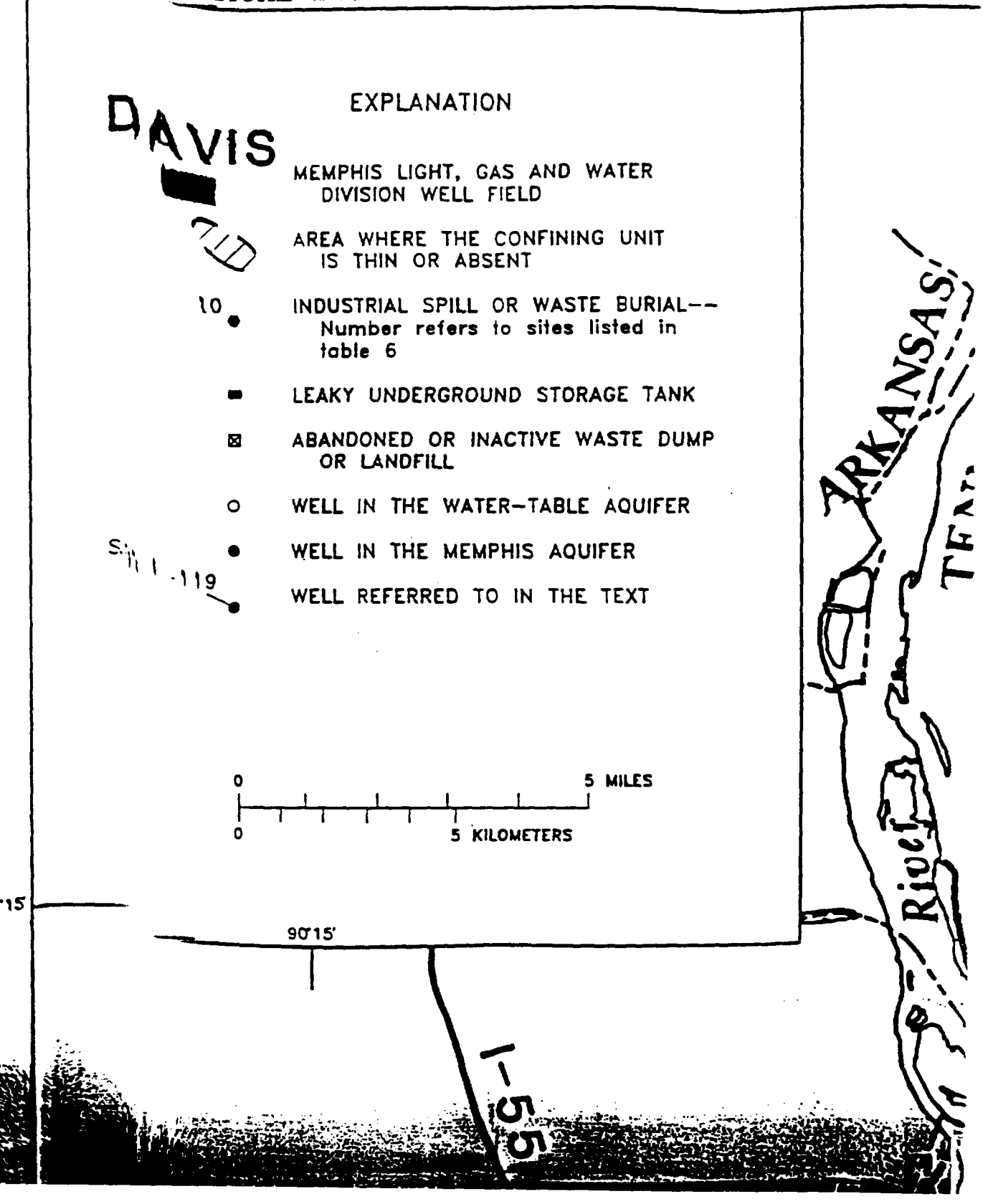
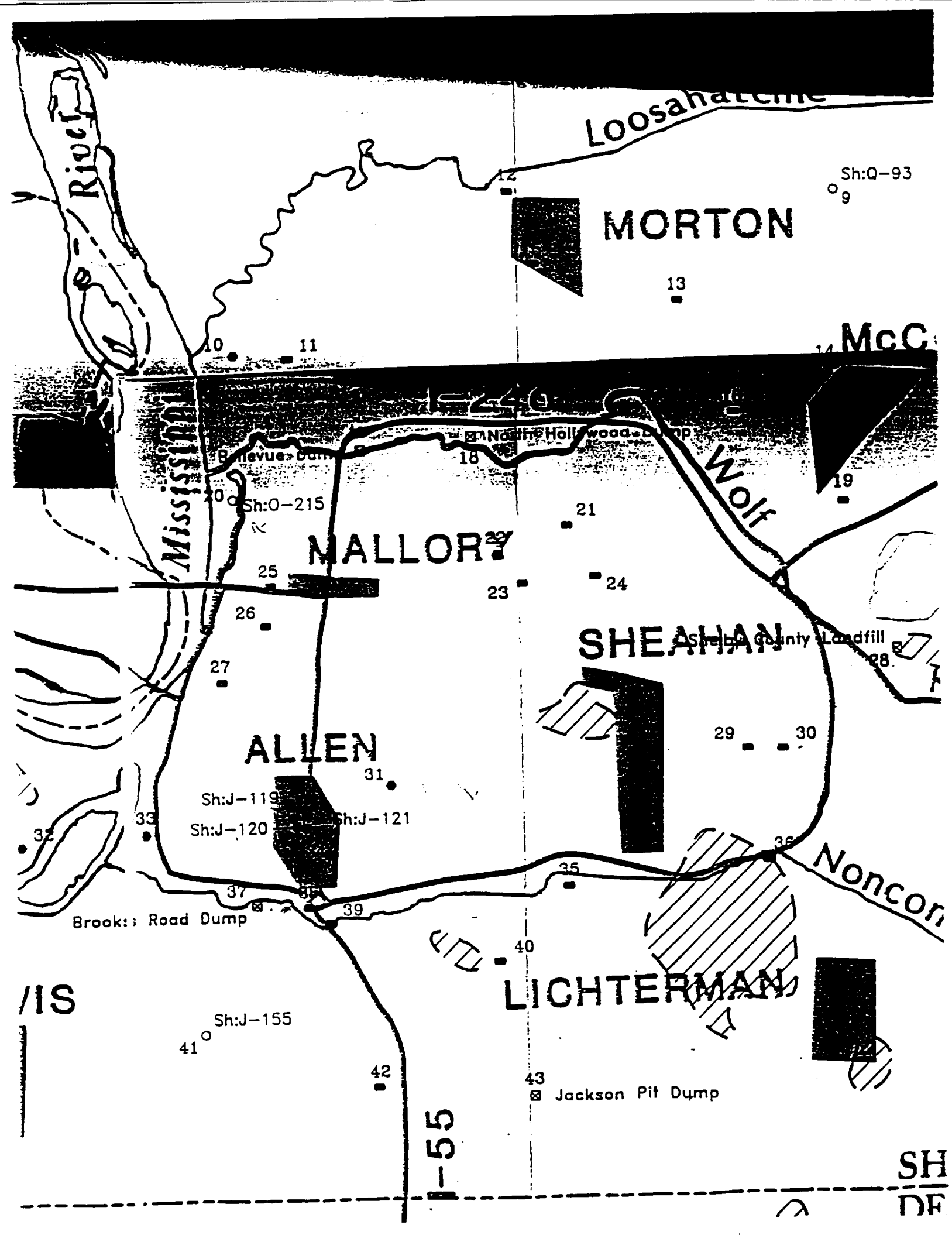

MORTON
MALLORY
SHEAHAN
ALLEN
LICHTERMAN
I-240
I-55
Wolf
Sh:P-179
Sh:P-204
Sh:P-76
Mississippi
AVIS

Plate 4




Loosahatchie
Sh:O-93
MORTON
McC
Mississippi River
Wolf
Sh:O-215
MALLORY
SHEAHAN
Shelby County Landfill
ALLEN
Sh:J-119
Sh:J-120
Sh:J-121
Noncon
Brooks Road Dump
LICHTERMAN
Sh:J-155
Jackson Pit Dump
I-55

HYDROGEOLOGY AND PRELIMINARY ASSESSMENT OF THE POTENTIAL FOR CONTAMINATION OF THE MEMPHIS AQUIFER IN THE MEMPHIS AREA, TENNESSEE

By William S. Parks

ABSTRACT

Detailed maps of the thickness of the Jackson-upper Claiborne confining unit and the altitude of the water table in the alluvium and fluvial deposits provide much new information concerning areas where downward leakage is or may be occurring from the water-table aquifers to the Memphis aquifer in the Memphis area. A detailed map of the altitude of the potentiometric surface of the Memphis aquifer and the locations of 44 sites where contaminants have been detected in the water-table aquifers indicate that many of these sites are located in areas where the direction of ground-water flow in the Memphis aquifer is toward municipal well fields. Consequently, if contaminants enter the Memphis aquifer, a hydraulic potential exists for their transport to those well fields.

Recently (1986-88), volatile organic compounds were detected in water from five municipal wells screened in the Memphis aquifer—three in the Allen well field of the Memphis Light, Gas and Water Division at Memphis and two in the west well field at Collierville. Concentrations of seven volatile organic compounds totaled about 11 micrograms per liter in a sample from one well in the Allen well field at Memphis, and the concentration of one compound was 25 micrograms per liter in a sample from one well at Collierville. These are the first reported occurrences of synthetic organic compounds in the Memphis aquifer and prove that the principal aquifer in the Memphis area is vulnerable to contamination.

INTRODUCTION

The City of Memphis presently (1989) depends solely on the Memphis aquifer for its water supply. Withdrawals from this aquifer in the Memphis area for municipal, industrial, and commercial uses were about 200 Mgal/d in 1988. Historically, the Memphis aquifer was thought of as an ideal artesian aquifer overlain by a thick, impermeable clay layer that serves as an upper confining unit and protects it from contamination from near-surface sources. Studies made over the past few decades, however, indicate that the confining unit locally is thin or absent or contains sand "windows" that could provide "pathways" for contaminants to reach the Memphis aquifer (Criner and others, 1964; Bell and Nyman, 1968; Parks and Lounsbury, 1976; Graham and Parks, 1986).

Other studies indicate that downward leakage from the water-table aquifers to the Memphis aquifer is widespread in the Memphis area (Graham and Parks, 1986; J.V. Brahana and

R.E. Broshears, USGS, written commun., 1987). Areas particularly susceptible to leakage are places where the confining unit is thin or absent and in the vicinity of the Memphis Light, Gas and Water Division (MLGW) well fields where leakage is accelerated as a result of pumping stress in the Memphis aquifer (Graham and Parks, 1986).

Recently, volatile organic compounds were detected in water from five municipal wells pumping from the Memphis aquifer—three in the MLGW Allen well field at Memphis (J.H. Webb, MLGW, oral commun., 1986-88) and two in the west well field at Collierville (J.L. Ashner, Tennessee Department of Health and Environment (TDHE), oral commun., 1986). These are the first reported occurrences of synthetic organic compounds in the Memphis aquifer and prove that the principal aquifer in the Memphis area is vulnerable to contamination.

The concerns about the effectiveness of the confining unit to protect the Memphis aquifer prompted the City of Memphis, MLGW, and the U.S. Geological Survey (USGS) in 1987 to initiate a cooperative investigation of the potential for contamination of the aquifer. This report summarizes the findings of the investigation.

Purpose and Scope

The objectives of this investigation were to: (1) prepare detailed maps of the thickness of the Jackson-upper Claiborne confining unit, the water table in the alluvium and fluvial deposits, and the potentiometric surface of the Memphis aquifer; (2) identify potential sources of contamination of the Memphis aquifer; (3) update knowledge of indications of downward leakage from the water-table aquifers to the Memphis aquifer; and (4) make a preliminary assessment of the potential for contamination of the Memphis aquifer.

The investigation was limited to the Memphis area, as defined in recent reports (about 1,500 square miles), which includes all of Shelby County and parts of Fayette and Tipton Counties, Tenn., DeSoto and Marshall Counties, Miss., and Crittenden and Mississippi Counties, Ark. (fig. 1). Emphasis was placed on Shelby County, Tenn., where most of the municipal well fields are located (fig. 1).

Tasks included in the investigation were to: (1) interpret and correlate geophysical logs selected from a USGS file of more than 500 logs, (2) measure water levels in about 140 wells in the water-table and Memphis aquifers, (3) search for historic water levels in the USGS and State files to supplement data for the water-table aquifers, (4) collect information from various regulatory agencies relative to the location and type of potential sources of contamination of the Memphis aquifer, and (5) prepare interpretive maps and the final report.

Previous Investigations

Many previous reports include information concerning the local and regional aspects of the aquifer systems in the Memphis area, and many others contain water-level and water-quality data. Consequently, this discussion of previous investigations is limited to primary sources of information concerning the hydrology, geology, water levels, and water quality of the principal aquifers and associated environmental concerns. This report and primary previous reports contain lists of references that provide additional information sources. Extensive lists of selected references (although not all inclusive) are given in reports by Graham and Parks (1986) and Brahana and others (1987).

The hydrology and general geology of the principal aquifers are described in reports by Safford (1890), Glenn (1906), Wells (1931, 1933), Kazmann (1944), Schneider and Cushing

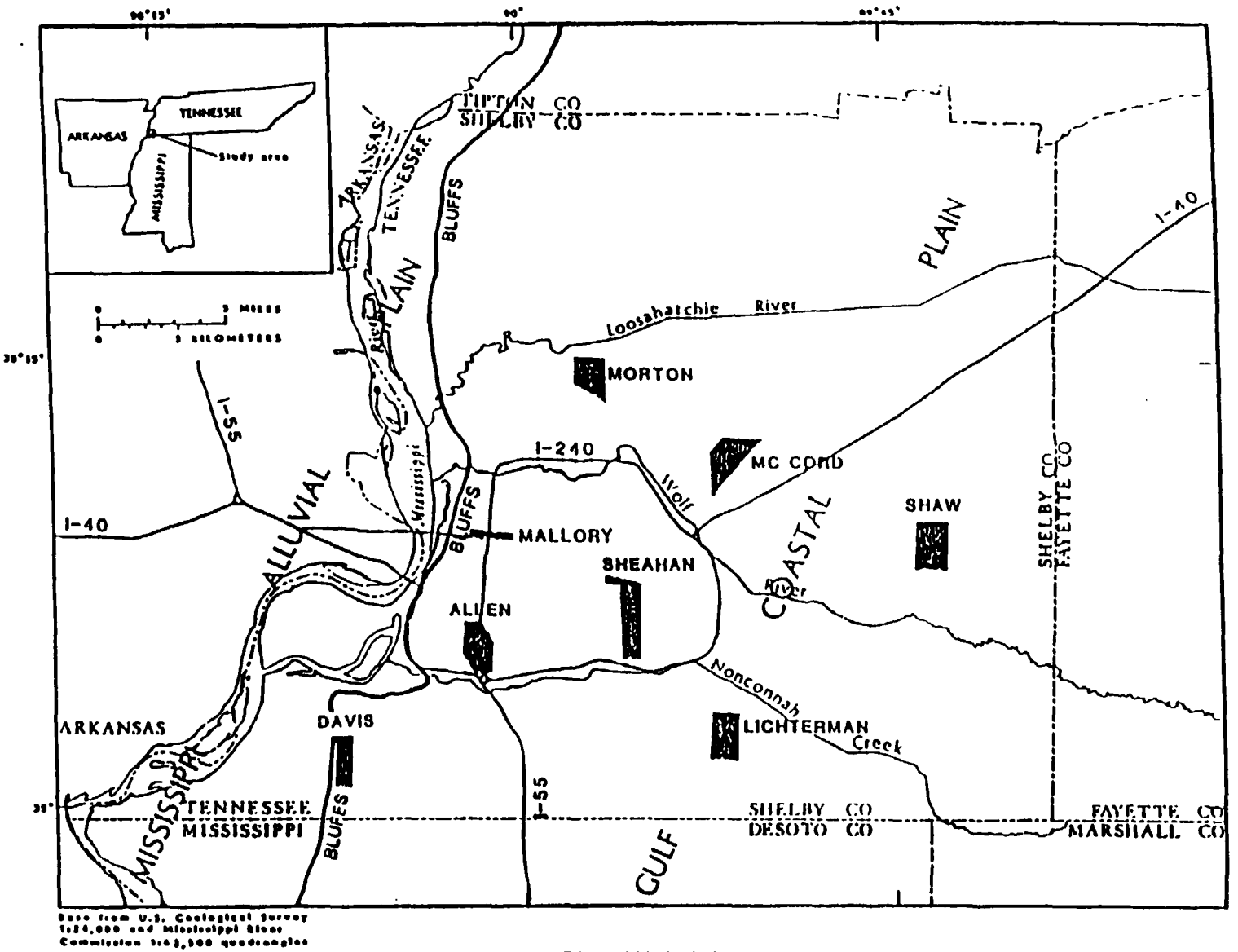


Figure 1.--Major physiographic subdivisions in the Memphis area and

(1948), Criner and Armstrong (1958), Plebuch (1961), Criner and others (1964), Nyman (1965), Bell and Nyman (1968), and Dalsin and Bettandorff (1976). Parks (1973, 1975, 1977, 1978, 1979a, 1979b, 1987a) mapped and described the surface and shallow subsurface geology of the Memphis urban area.

A series of potentiometric-surface maps and graphs showing historic water-level changes and pumpage (1886-1975) from the Memphis and Fort Pillow aquifers are included in a report by Criner and Parks (1976). The potentiometric surface of the Memphis aquifer in August 1978 was given by Graham (1979). Graham (1982) updated pumpage and water-level information for the Memphis and Fort Pillow aquifers through 1980 and included a map of the potentiometric surface of the Memphis aquifer for September 1980. The altitude of the water table in the alluvium and fluvial deposits and the potentiometric surfaces of the Memphis and Fort Pillow aquifers in the Memphis urban area for the fall 1984 are included in a report by Graham and Parks (1986).

A two-dimensional digital computer flow model of the Memphis aquifer was described by Brahana (1982). The application of this model as a predictive tool to estimate aquifer response to various hypothetical pumpage projections was described by Brahana and included in the U.S. Army Corps of Engineers, Memphis Metropolitan Urban Water Resources Study (1981). Brahana and Broshears (USGS, written commun., 1987) described the hydrologic framework of the Memphis area and documented the development of an integrated conceptual model of the ground-water flow and testing of this conceptual model through application of a multilayer finite-difference flow model.

Information concerning quality of water in the principal aquifers in the Memphis area is in reports by Wells (1933), Schneider and Cushing (1948), Lanphere (1955), Criner and Armstrong (1958), Plebuch (1961), Criner and others (1964), Bell and Nyman (1968), and Dalsin and Bettandorff (1976). Graham (1982) summarized the quality of water in the principal aquifers and discussed the potential for contamination of the aquifers. A report by Parks and others (1982) describes the installation and sampling of observation wells at six abandoned or inactive dumps in the Memphis area and provides data on the quality of water in the water-table aquifers at these sites. Graham (1985) described the installation and sampling of additional wells at the North Hollywood Dump and gave a summary of the quality of water in the water-table aquifers in the area of the dump.

Brahana and others (1987) provided background information concerning the quality of natural, uncontaminated water from the principal aquifers in the Memphis area, including tables summarizing the minimum, median, and maximum concentrations of selected major and trace inorganic constituents. This report also summarizes water-quality data for the MLGW well fields. McMaster and Parks (1988) provided background information concerning concentrations of selected trace inorganic constituents and synthetic organic compounds in the water-table aquifers. This report summarizes the results of previous investigations that give information concerning quality of water in the water-table aquifers.

A summary of some current and possible future environmental problems related to geology and hydrology in the Memphis area is given in a report by Parks and Lounsbury (1976). Rima (1979) discussed the susceptibility of the Memphis ground-water supply to contamination from a pesticide waste-disposal site in northeastern Hardeman County, Tenn. Graham and Parks (1986) described the potential for leakage among the principal aquifers in the Memphis area and provided information to support the fact that downward leakage from the water-table aquifers to the Memphis aquifer is widespread.

They also summarize information from previous investigations documenting downward leakage. Parks (1987b) summarized indications of downward leakage from the water-table aquifers to the principal artesian aquifer (Memphis aquifer) at Memphis.

Acknowledgments

Acknowledgments are due many individuals who contributed information or provided assistance during this investigation, particularly in regard to the identification of potential sources of contamination and the measurement of water levels. Early in the investigation, Ms. Jennifer L. Ashner, formerly with the TDHE, Division of Solid Waste Management (DSWM), provided information about sites under investigation in Shelby County, Tenn. Later, Mr. John Fox, Jr., with the TDHE, Division of Ground Water Protection (DGWP), provided lists of 1,679 underground storage tanks in Shelby County, Tenn. Before water-level measurements were made, Mr. James C. Ozment, then with the DGWP, provided information concerning investigations of underground storage tanks in Shelby County where wells installed in the water-table aquifers were available for measurement. Ms. Gwynne A. Woodward of the DSWM provided information on wells in the water-table aquifers at landfills and other sites under investigation and assisted in measuring water levels at many sites. Messrs. Fred P. Von Hofe and William J. Cole, MLGW, arranged to turn off many wells in the Memphis aquifer in the MLGW well fields during a high water-demand period and provided personnel to make airline measurements in the wells. Mr. Ozment, with the TDHE Underground Storage Tank Program, also reviewed the files of underground-storage-tank investigations and identified sites where the water-table aquifers are contaminated. Mr. J. Paul Patterson and Ms. Woodward of the DSWM provided information about contamination of the water-table aquifers at several sites under investigation. Ms. Betty J. Maness and Mr. W. Jordan English of the TDHE, Division of Superfund, reviewed a list and identified sites where contaminants have been detected in the water-table aquifers and provided water-quality analyses for these sites and the two contaminated wells screened in the Memphis aquifer at Collierville. Mr. R.R. Franklin of the U.S. Environmental Protection Agency (U.S. EPA) provided information concerning the Gallaway pits. Mr. James H. Webb, MLGW, provided information concerning contaminants that have been detected in water from wells screened in the Memphis aquifer in the Allen well field.

PHYSIOGRAPHIC SETTING

The Memphis area is situated in two major physiographic subdivisions (fig. 1). The eastern three-quarters of the area is in the Gulf Coastal Plain section and the western one-quarter is in the Mississippi Alluvial Plain section of the Coastal Plain physiographic province (Fenneman, 1938). The principal river in the area is the Mississippi River; the major tributaries are the Wolf River, the Loosahatchie River, and Nonconnah Creek.

The Gulf Coastal Plain is characterized by gently rolling to steep topography formed as a result of erosion of geologic formations of Quaternary and Tertiary age. During the later stages of Pleistocene glaciation, this topography was covered by a relatively thick blanket of loess that makes up the present land surface. The gently rolling to steep topography is broken in many places by the flat-lying alluvial plains of streams crossing the area. Perhaps the most distinctive feature of the Gulf Coastal Plain is the loess covered bluffs that rise abruptly above the Mississippi Alluvial Plain at its eastern boundary. Land-surface altitudes in the Gulf Coastal Plain are as low as 190 feet above sea level at the mouth of Nonconnah Creek in southwestern

Shelby County, Tenn., and are as high as 470 feet above sea level in southwestern Fayette County, Tenn. Maximum local relief between the Gulf Coastal Plain and the Mississippi Alluvial Plain is about 200 feet along the bluffs in northwestern Shelby County.

The Mississippi Alluvial Plain is flat lying and is characterized by features of fluvial deposition such as point bars, abandoned channels, and natural levees. Land-surface altitudes are as low as 180 feet above sea level on the banks of the Mississippi River in extreme northwestern DeSoto County, Miss., and as high as 230 feet above sea level adjacent to the bluffs in southwestern Tipton County, Tenn. Maximum local relief commonly is not more than 10 or 20 feet, except where the Mississippi Alluvial Plain is built up above flood levels by man-placed fill.

HYDROGEOLOGY

The Memphis area is located in the north-central part of the Mississippi embayment, a broad structural trough or syncline that plunges southward along an axis that approximates the Mississippi River (Cushing and others, 1964). This syncline is filled with a few thousand feet of unconsolidated to semiconsolidated sediments that make up formations of Cretaceous and Tertiary age. These formations dip gently westward into the embayment and southward down the axis. Overlying the Cretaceous and Tertiary formations in many areas are the fluvial deposits (terrace deposits), loess, and alluvium of Tertiary(?) and Quaternary age. Descriptions of the post-Wilcox Group geologic units and their hydrologic significance in the Memphis area are given in table 1.

Table 1.--*Post-Wilcox Group geologic units underlying the Memphis area and their hydrologic significance*

[Modified from Graham and Parks, 1986]

System	Series	Group	Stratigraphic unit	Thickness, in feet	Lithology and hydrologic significance
Quaternary	Holocene and Pleistocene		Alluvium	0-175	Sand, gravel, silt, and clay. Underlies the Mississippi Alluvial Plain and alluvial plains of streams in the Gulf Coastal Plain. Thickest beneath the Alluvial Plain, where commonly between 100 and 150 feet thick; generally less than 50 feet thick elsewhere. Provides water to domestic, farm, industrial, and irrigation wells in the Mississippi Alluvial Plain.
	Pleistocene		Loess	0-85	Silt, silty clay, and minor sand. Principal unit at the surface in upland areas of the Gulf Coastal Plain. Thickest on the bluffs that border the Mississippi Alluvial Plain; thinner eastward from the bluffs. Tends to retard downward movement of water providing recharge to the fluvial deposits.
Quaternary and Tertiary(?)	Pleistocene and Pliocene(?)		Fluvial deposits (terrace deposits)	0-100	Sand, gravel, minor clay and ferruginous sandstone. Generally underlie the loess in upland areas, but are locally absent. Thickness varies greatly because of erosional surfaces at top and base. Provides water to many domestic and farm wells in rural areas.
Tertiary	Eocene	? Claiborne	Jackson Formation and upper part of Claiborne Group, includes Cocktield and Cook Mountain Formations (capping clay)	0-375	Clay, silt, sand, and lignite. Because of similarities in lithology, the Jackson Formation and upper part of the Claiborne Group cannot be reliably subdivided areally based on present work. Most of the preserved sequence consists of the Cocktield and Cook Mountain Formations, but the Jackson Formation occurs beneath the higher hills and ridges in the northern part of the Memphis area. Serves as the upper confining unit for the Memphis aquifer.
			Memphis Sand ("500-foot" sand)	500-880	Sand, clay, and minor lignite. Thick body of sand with lenses of clay at various stratigraphic horizons and minor lignite. Thickest in the southwestern part of the Memphis area; thinnest in the northeastern part. Principal aquifer providing water for municipal and industrial supplies east of the Mississippi River; sole source of water for the City of Memphis. Underlain by the Flour Island Formation of the Wilcox Group, which serves as the lower confining unit for the Memphis aquifer.

Hydrogeologic units considered in this report (discussed in descending order of age) are: (1) the alluvium and fluvial deposits that comprise the shallow water-table aquifers, (2) the Jackson Formation and the Cockfield and Cook Mountain Formations in the upper part of the Claiborne Group that comprise the Jackson-upper Claiborne confining unit, and (3) the Memphis Sand that comprises the Memphis aquifer. Hydrogeologic sections showing the principal aquifers and confining units in the Memphis area are given in figure 2.

The alluvium occurs beneath the Mississippi Alluvial Plain and alluvial plains of streams draining the Gulf Coastal Plain (fig. 1) and consists primarily of sand, gravel, silt, and clay. The unit generally consists of fine sand, silt, and clay in the upper part, and sand and gravel in the lower part. The alluvium ranges from 0 to 175 feet in thickness. It commonly is about 100 to 150 feet thick beneath the Mississippi Alluvial Plain and less than 50 feet thick beneath the alluvial plains of major streams draining the Gulf Coastal Plain. The alluvium supplies water to many domestic, farm, industrial, and irrigation wells in the Mississippi Alluvial Plain.

The fluvial deposits occur beneath the uplands and valley slopes of the Gulf Coastal Plain (fig. 1) and consist primarily of sand, gravel, and minor clay lenses. Locally, the sand and gravel is cemented with iron oxide to form thin layers of ferruginous sandstone or conglomerate in the lower or basal parts. The fluvial deposits range from 0 to 100 feet in thickness. Thickness varies because of erosional surfaces at both the top and base of the unit. The fluvial deposits provide water to many domestic and farm wells in rural areas of the Gulf Coastal Plain.

Because of the lithologic similarities of the Jackson, Cockfield, and Cook Mountain Formations and upper part of the Memphis Sand, a detailed study of the stratigraphy and geologic structure would be needed to correlate the units on the many geophysical logs available for wells and test holes drilled in the Memphis area. Such a study is beyond the scope of the present investigation. For the Gulf Coast Regional Aquifer-System Analysis (GC RASA) investigation (Grubb, 1984), however, the Jackson, Cockfield, and Cook Mountain Formations were correlated and mapped regionally in the subsurface of western Tennessee and the occurrence of these units was extended into the Memphis area (Parks and Carmichael, 1990a,b). From the GC-RASA work and additional observations made during the present investigation, some generalizations can be made concerning the occurrence of these units.

The Jackson Formation, which was once thought to comprise most of the thickness of the confining unit separating the water-table aquifers from the Memphis aquifer, occurs only beneath the higher hills and ridges in the northern part of the Memphis area. Based on geophysical-log correlations, this unit consists generally of fine sand or sandy clay and ranges from 0 to about 50 feet in thickness. The Jackson Formation (Tennessee, Kentucky, and Missouri) and the Jackson Group (Mississippi, Arkansas, Louisiana, and Texas) overlies the Cockfield Formation (Yegua Formation in Texas) and is part of a thick regional confining unit for the Cockfield aquifer (Hosman, 1988). In the Memphis area, the Jackson Formation is included in the upper part of the Jackson-upper Claiborne confining unit.

The Cockfield Formation occurs in the subsurface in most of the Memphis area, extending eastward at places nearly to the approximate eastern limits of the Jackson-upper Claiborne confining unit (plate 1). The Cockfield Formation consists of interfingering fine sand, silt, clay, and local lenses of lignite. The unit ranges from 0 to about 250 feet in thickness. In most of the Memphis area, the formation is an erosional remnant, and the original thickness is preserved

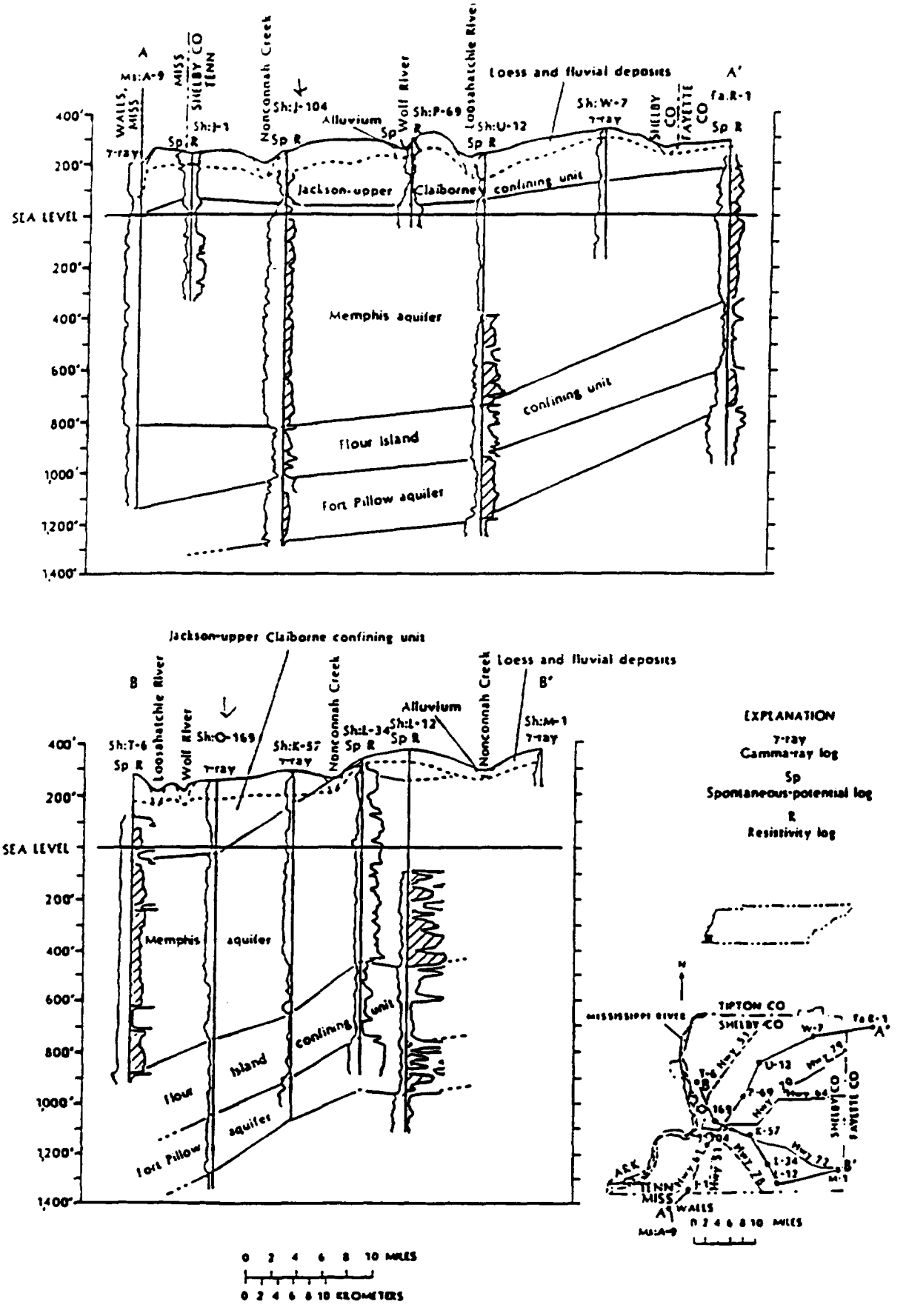


Figure 2.—Hydrogeologic sections showing the principal aquifers and confining units in the Memphis area (Modified from Graham and Parks, 1986.)

only beneath the higher hills and ridges in the northern part. The discontinuous and interconnected sands of the Cockfield Formation constitute a regional aquifer in some parts of the area of occurrence in Tennessee, Kentucky, Missouri, Arkansas, Louisiana, Texas (Yegua Formation), and Mississippi (Hosman, 1988). In the Memphis area, the Cockfield Formation consists predominantly of fine sediments and lacks the thicker, coarser sands present in other areas. Consequently, the formation is included in the Jackson-upper Claiborne confining unit. A few domestic wells in the Memphis area are screened in sands in the Cockfield Formation.

The Cook Mountain Formation occurs in the subsurface of most of the Memphis area, extending eastward to the approximate eastern limits of the Jackson-upper Claiborne confining unit (plate 1). The Cook Mountain Formation consists primarily of clay, but it locally contains varying amounts of fine sand. The formation ranges from about 30 to 150 feet in thickness, but it is commonly about 60 to 70 feet thick. The Cook Mountain Formation is a regional confining unit overlying the Memphis Sand in Tennessee, Missouri, and northeastern Arkansas and the Sparta Sand in Kentucky, southern Arkansas, Louisiana, and Mississippi (Hosman, 1988). In the Memphis area, the formation is the most persistent clay layer in the Jackson-upper Claiborne confining unit.

The Memphis Sand occurs in the subsurface of all of the Memphis area. Eastward from the approximate eastern limits of the Jackson-upper Claiborne confining unit (plate 1), the eroded upper part of the Memphis Sand directly underlies the alluvium and fluvial deposits. The Memphis Sand consists primarily of a thick body of sand that includes subordinate lenses of clay and silt at various horizons and ranges from about 500 to 900 feet in thickness. The Memphis Sand (and its equivalents) is a regional aquifer in Tennessee, Missouri, Kentucky (Tallahatta Formation and Sparta Sand), and northeastern Arkansas. The Memphis Sand is equivalent to (in ascending order) the Tallahatta Formation, Winona Sand, Zilpha Clay, and Sparta Sand of northern Mississippi and the Carrizo Sand, Cane River Formation, and Sparta Sand of southern Arkansas (Hosman, 1988). In the Memphis area, the Memphis aquifer provides water for most municipal, industrial, and commercial supplies.

Thickness of the Confining Unit Overlying the Memphis Aquifer

The thickness of the Jackson-upper Claiborne confining unit and aggregate thicknesses of clay beds in the confining unit thicker than 10 feet are shown in plate 1. This map was prepared by interpretation and correlation of 236 geophysical logs made primarily in test holes for water wells or through the casings of observation wells and abandoned water wells. These logs were selected from a file of more than 500 electric and gamma-ray logs made by the USGS in the Memphis area from the early 1950's to 1989. Most of the logs in the file were examined during this investigation. Because many of the geophysical logs were made in test holes drilled at MLGW and industrial well fields, the logs used for making the map were selected on the basis of well spacing and, when a choice could be made, on the basis of the quality of the log. Through the years, wells were drilled on some MLGW well field lots to both the Memphis and Fort Pillow aquifers or to replace wells in the Memphis aquifer to about the same or greater depths. Thus, the file may contain as many as three logs for wells on the same well lots. In addition, lots in MLGW well fields are commonly about 1,000 feet apart, necessitating a further selection of logs based on well spacing for the scale of the map. Interpretive information from the geophysical logs used to prepare the map showing the thickness of the Jackson-upper Claiborne confining unit and aggregate thicknesses of clay beds in the confining unit thicker than 10 feet (plate 1) are given in table 2.

Table 2.--*Thickness of the Jackson-upper Claiborne confining unit and aggregate thicknesses of clay beds in the confining unit thicker than 10 feet in the Memphis area*--Continued

Well No.	Latitude	Longitude	Altitude	Base of water-table aquifer	Base of Cook Mountain Formation	Thickness of confining unit	Clay bed top	Clay bed bottom	Clay bed thickness	Clay bed top	Clay bed bottom	Clay bed thickness	Aggregate thicknesses of clay beds
Sh:J-38	350711	0900107	315	97	238	141	109	238	129	--	--	--	129
Sh:J-41	350723	0900213	275	49	248	199	82	116	34	185	248	63	97
Sh:J-47	350508	0900459	230	94	226	132	94	108	14	154	226	72	86
Sh:J-49	350611	0900344	280	75	277	202	112	141	29	149	189	40	
							220	243	23	260	277	17	109
Sh:J-50	350411	0900416	241	54	187	133	104	187	83	--	--	--	83
Sh:J-59	350402	0900513	241	104	189	85	104	189	85	--	--	--	85
Sh:J-62	350459	0900330	223	45	183	138	45	76	31	89	183	94	125
Sh:J-65	350232	0900249	303	94	205	111	94	132	38	145	205	60	98
Sh:J-71	350206	0900212	295	97	165	68	97	108	11	115	165	50	61
Sh:J-74	350022	0900117	303	65	140	75	72	140	68	--	--	--	68
Sh:J-83	350319	0900144	280	45	167	122	45	95	50	112	144	32	82
Sh:J-84	350536	0900627	243	168	197	29	168	186	18	--	--	--	18
Sh:J-104	350537	0900145	248	82	202	120	117	202	85	--	--	--	85
Sh:J-111	350503	0900132	280	114	240	126	114	128	14	140	240	100	114
Sh:J-113	350449	0900136	272	85	174	89	85	174	89	--	--	--	89
Sh:J-115	350553	0900223	295	101	262	161	101	119	18	131	262	131	149
Sh:J-119	350521	0900204	260	98	180	82	112	180	68	--	--	--	68
Sh:J-127	350438	0900136	245	40	168	128	40	57	17	65	79	14	
							88	168	80	--	--	--	111
Sh:J-129	350353	0900640	290	103	249	146	103	160	57	180	249	69	126
Sh:J-133	350653	0900119	300	88	310	222	88	164	76	230	310	80	156
Sh:J-138	350146	0900702	300	84	242	158	162	242	80	--	--	--	80
Sh:J-144	350053	0900708	280	96	204	108	136	204	68	--	--	--	68
Sh:J-168	350611	0900205	278	100	210	110	130	210	80	--	--	--	80
Sh:K-13	350541	0895902	295	80	224	144	117	224	107	--	--	--	107
Sh:K-16	350523	0895801	293	55	206	151	55	110	55	132	206	74	129
Sh:K-23	350647	0895420	320	112	220	108	112	136	24	161	198	37	
							204	220	16	--	--	--	77
Sh:K-28	350111	0895905	320	36	150	114	88	117	29	123	150	27	56
Sh:K-29	350258	0895929	271	58	94	36	58	94	36	--	--	--	36
Sh:K-31	350143	0895357	317	27	52	25	27	52	25	--	--	--	25
Sh:K-33	350545	0895925	275	65	210	145	65	102	37	110	210	100	137
Sh:K-72	350509	0895553	252	44	150	106	44	150	106	--	--	--	106
Sh:K-79	350024	0895627	350	36	172	136	36	66	30	85	172	87	117
Sh:K-81	350103	0895719	380	44	184	140	44	86	42	99	184	85	127
Sh:K-98	350633	0895438	313	83	176	93	128	176	48	--	--	--	48
Sh:K-99	350627	0895533	285	92	118	26	105	118	13	--	--	--	13
Sh:K-104	350151	0895340	300	32	37	5	32	37	5	--	--	--	5
Sh:K-108	350153	0895259	295	24	74	50	24	74	50	--	--	--	50
Sh:K-109	350532	0895553	258	66	194	128	66	84	18	119	194	75	93
Sh:K-114	350205	0895341	302	21	47	26	21	47	26	--	--	--	26
Sh:K-115	350560	0895547	273	92	170	78	92	102	10	132	170	38	48

Table 2.--*Thickness of the Jackson-upper Claiborne confining unit and aggregate thicknesses of clay beds in the confining unit thicker than 10 feet in the Memphis area*

[Latitude and longitude are in degrees, minutes, and seconds; altitude is in feet above sea level; base of water-table aquifer, base of Cook Mountain Formation, and tops and bottoms of clay beds are depths in feet below land surface; thicknesses are in feet; dashes (--) indicate no data given for any clay beds below base of the Cook Mountain Formation]

Well No.	Latitude	Longitude	Altitude	Base of water-table aquifer	Base of Cook Mountain Formation	Thickness of confining unit	Clay bed top	Clay bed bottom	Clay bed thickness	Clay bed top	Clay bed bottom	Clay bed thickness	Aggregate thicknesses of clay beds
Ar:C-1	350958	0901738	209	148	288	140	172	204	32	220	288	68	100
Ar:E-2	350519	0901810	207	102	313	211	102	142	40	256	313	57	97
Ar:H-2	350344	0901300	211	90	266	176	90	120	30	162	266	104	134
Ar:H-4	350724	0901347	214	154	272	118	190	272	82	--	--	--	82
Ar:N-1	350849	0900928	211	84	182	98	84	99	15	110	182	72	87
Ar:O-1	351349	0900628	217	105	302	197	105	120	15	126	167	41	
							223	302	79	--	--	--	135
Ar:O-2	350745	0900553	227	99	227	128	99	131	32	150	227	77	109
Ms:A-7	345919	0900828	220	57	150	93	74	150	76	--	--	--	76
Ms:A-9	345731	0900911	211	127	204	77	134	204	70	--	--	--	70
Ms:A-12	345712	0900915	210	117	198	81	117	198	81	--	--	--	81
Ms:A-29	345748	0900629	302	78	318	240	130	140	10	178	204	26	
							242	318	76	--	--	--	112
Ms:A-103	345737	0901028	211	124	226	102	124	226	102	--	--	--	102
Ms:B-5	345835	0900054	325	60	177	117	90	177	87	--	--	--	87
Ms:B-6	345740	0895945	335	49	161	112	104	161	57	--	--	--	57
Ms:B-7	345917	0900100	305	28	123	95	40	54	14	77	113	36	50
Ms:B-63	345657	0900311	289	86	172	86	86	172	86	--	--	--	86
Ms:C-4	345817	0895712	373	50	147	97	119	147	28	--	--	--	28
Ms:C-15	345812	0895851	345	40	198	158	98	198	100	--	--	--	100
Ms:C-17	345805	0895400	402	56	66	10	56	66	10	--	--	--	10
Ms:D-3	345747	0894943	391	53	124	71	53	124	71	--	--	--	71
Ms:D-26	345903	0894741	402	61	82	21	61	82	21	--	--	--	21
Ms:D-46	345709	0895014	412	51	174	123	51	84	33	98	174	76	109
Ms:D-57	345820	0895142	390	36	101	65	36	101	65	--	--	--	65
Fa:R-1	352226	0893301	318	40	122	82	40	122	82	--	--	--	82
Sh:E-3	345842	0895221	335	24	65	41	24	65	41	--	--	--	41
Sh:E-4	345943	0894802	403	76	153	77	76	87	11	101	153	52	63
Sh:H-1	350331	0900729	312	110	270	160	134	270	136	--	--	--	136
Sh:H-2	350405	0900738	215	94	201	107	94	201	107	--	--	--	107
Sh:H-8	350157	0900742	305	84	246	162	138	164	26	181	246	65	91
Sh:H-11	350115	0900740	274	50	191	141	50	65	15	86	102	16	
							139	191	52	--	--	--	83
Sh:H-13	350452	0900759	238	114	198	84	123	175	52	185	198	13	65
Sh:J-1	350004	0900546	240	50	162	112	50	66	16	78	162	84	102
Sh:J-10	350501	0900239	270	104	214	110	104	214	110	--	--	--	110
Sh:J-27	350716	0900330	268	60	265	205	60	107	47	202	265	63	110
Sh:J-32	350657	0900426	280	122	262	140	122	139	17	197	262	65	82

Table 2.--*Thickness of the Jackson-upper Claiborne confining unit and aggregate thicknesses of clay beds in the confining unit thicker than 10 feet in the Memphis area*--Continued

Well No.	Lati-tude	Longi-tude	Alti-tude	Base of water-table aquifer	Base of Cook Mountain Formation	Thickness of confining unit	Clay bed top	Clay bed bot-tom	Clay bed thick-ness	Clay bed top	Clay bed bot-tom	Clay bed thick-ness	Aggregate thicknesses of clay beds
Sh:K-120	350008	0895450	362	29	133	104	46	63	17	83	133	50	67
Sh:K-122	350434	0895739	240	33	155	122	33	155	122	--	--	--	122
Sh:K-125	350114	0895822	311	26	138	112	54	72	18	104	138	34	52
Sh:K-127	350024	0895838	320	36	178	142	60	81	21	107	178	71	92
Sh:K-139	350810	0895528	295	96	120	24	102	120	18	--	--	--	18
Sh:K-141	350724	0895553	311	106	176	70	121	176	55	--	--	--	55
Sh:K-142	350642	0895550	278	99	105	6	99	105	6	--	--	--	6
Sh:K-143	350233	0895938	281	59	112	53	80	112	32	--	--	--	32
Sh:K-148	350228	0895232	300	35	51	16	35	51	16	--	--	--	16
Sh:L-9	350504	0894828	370	45	127	82	45	73	28	100	127	27	55
Sh:L-15	350412	0894530	341	28	74	48	26	74	48	--	--	--	48
Sh:L-17	350721	0895130	310	20	108	88	20	45	25	60	76	16	
							91	108	17	--	--	--	58
Sh:L-18	350516	0894940	320	17	93	76	17	93	76	--	--	--	76
Sh:L-21	350540	0895211	330	51	151	100	99	151	52	--	--	--	52
Sh:L-23	350519	0895212	330	76	155	79	94	155	61	--	--	--	61
Sh:L-25	350435	0895034	288	24	128	104	38	128	90	--	--	--	90
Sh:L-26	350248	0895123	352	43	91	48	43	91	48	--	--	--	48
Sh:L-27	350457	0895044	317	45	154	109	70	154	84	--	--	--	84
Sh:L-29	350440	0894947	325	27	135	108	27	135	108	--	--	--	108
Sh:L-32	350146	0895200	332	23	86	63	23	86	63	--	--	--	63
Sh:L-38	350232	0895158	315	16	72	56	16	72	56	--	--	--	56
Sh:L-46	350658	0894920	260	42	113	71	42	113	71	--	--	--	71
Sh:L-52	350024	0894722	390	52	120	68	52	120	68	--	--	--	68
Sh:L-57	350534	0895121	320	44	157	113	48	157	109	--	--	--	109
Sh:L-61	350354	0895038	272	26	75	49	26	75	49	--	--	--	49
Sh:L-64	350639	0895225	305	53	165	112	88	165	77	--	--	--	77
Sh:L-67	350447	0894828	380	36	136	100	75	85	10	98	136	40	50
Sh:L-69	350259	0895213	329	33	78	45	33	78	45	--	--	--	45
Sh:L-70	350207	0895224	307	21	71	50	20	71	50	--	--	--	50
Sh:L-81	350450	0894807	380	52	156	104	52	82	30	94	156	62	92
Sh:L-88	350730	0894900	257	42	42	0	--	--	--	--	--	--	0
Sh:L-95	350349	0894501	369	58	114	56	58	114	56	--	--	--	56
Sh:L-96	350323	0895156	331	38	90	52	38	90	52	--	--	--	52
Sh:L-97	350207	0895110	353	26	82	56	26	82	56	--	--	--	56
Sh:L-99	350441	0894809	368	32	142	110	32	42	10	44	85	41	
							99	142	43	--	--	--	94
Sh:L-102	350155	0895137	342	90	105	15	90	105	15	--	--	--	15
Sh:M-11	350223	0894459	338	60	71	11	60	71	11	--	--	--	11
Sh:M-17	350017	0894417	338	41	41	0	--	--	--	--	--	--	0
Sh:M-24	350653	0894215	340	33	87	54	33	87	54	--	--	--	54
Sh:M-26	350404	0894358	332	49	66	17	49	66	17	--	--	--	17

Table 2.--*Thickness of the Jackson-upper Claiborne confining unit and aggregate thicknesses of clay beds in the confining unit thicker than 10 feet in the Memphis area*--Continued

Well No.	Lati-tude	Longi-tude	Alti-tude	Base of water-table aquifer	Base of Cook Mountain Formation	Thickness of confining unit	Clay bed top	Clay bed bot-tom	Clay bed thick-ness	Clay bed top	Clay bed bot-tom	Clay bed thick-ness	Aggregate thicknesses of clay beds
Sh:M-27	350334	0894355	355	54	75	21	62	75	13	--	--	--	13
Sh:M-37	350642	0894300	335	42	72	30	42	72	30	--	--	--	30
Sh:M-39	350344	0894449	363	62	98	36	62	98	36	--	--	--	36
Sh:M-40	350460	0894444	342	34	97	63	34	97	63	--	--	--	63
Sh:M-41	350407	0894457	355	64	126	62	64	126	62	--	--	--	62
Sh:M-43	350413	0894133	320	64	64	0	--	--	--	--	--	--	0
Sh:O-1	351437	0900046	229	57	290	233	150	290	140	--	--	--	140
Sh:O-18	351034	0900243	235	76	240	164	76	98	22	118	240	122	144
Sh:O-54	351119	0900223	238	77	306	229	77	185	108	203	306	103	211
Sh:O-67	350828	0900214	266	91	264	173	91	126	35	150	264	114	149
Sh:O-82	350833	0900147	288	87	258	171	87	102	15	164	198	32	
							220	258	38	--	--	--	85
Sh:O-93	350839	0900239	238	46	242	196	46	114	68	129	242	113	181
Sh:O-115	351219	0900232	272	60	328	268	123	328	205	--	--	--	205
Sh:O-120	351050	0900035	230	72	158	86	89	113	24	124	158	34	58
Sh:O-184	350956	0900139	251	78	333	255	78	184	106	193	333	140	246
Sh:O-191	350818	0900335	278	99	292	193	100	148	48	158	292	134	182
Sh:O-194	350817	0900043	295	64	278	214	184	278	94	--	--	--	94
Sh:O-199	350846	0900311	285	65	289	224	102	164	62	179	289	110	172
Sh:O-202	351032	0900143	242	71	256	185	71	256	185	--	--	--	185
Sh:O-204	350922	0900154	257	78	301	223	78	140	62	176	301	125	187
Sh:O-208	350805	0900204	272	82	264	182	82	110	28	168	264	96	126
Sh:O-207	350913	0900109	255	81	236	155	130	236	106	--	--	--	106
Sh:O-213	350916	0900030	250	78	246	168	160	246	86	--	--	--	86
Sh:O-243	350808	0900022	280	70	254	184	70	90	20	166	254	88	108
Sh:P-1	351320	0895401	300	41	239	198	103	120	17	149	239	90	107
Sh:P-11	351028	0893050	244	62	182	120	62	88	26	101	182	81	107
Sh:P-14	350943	0895757	252	62	194	132	62	94	32	107	194	87	119
Sh:P-34	350807	0895825	283	104	188	84	125	188	63	--	--	--	63
Sh:P-36	350950	0895833	243	80	217	137	120	217	97	--	--	--	97
Sh:P-39	351045	0895655	251	62	270	208	62	75	13	83	95	12	
							193	270	77	--	--	--	102
Sh:P-54	350904	0895805	255	80	234	154	166	234	68	--	--	--	68
Sh:P-62	350735	0895733	280	94	170	76	94	108	12	127	170	43	55
Sh:P-69	351220	0895525	300	64	200	136	80	104	24	111	123	12	
							132	200	68	--	--	--	104
Sh:P-71	351323	0895754	290	65	289	224	99	134	35	144	289	145	180
Sh:P-73	350901	0895246	250	52	102	50	52	102	50	--	--	--	50
Sh:P-75	351246	0895525	330	41	276	235	139	276	137	--	--	--	137
Sh:P-78	350735	0895932	267	84	178	92	84	124	40	132	176	44	84
Sh:P-79	350738	0895635	311	109	131	22	109	131	22	--	--	--	22
Sh:P-85	351101	0895240	293	76	220	144	76	117	41	168	220	52	93
Sh:P-88	351131	0895312	275	30	226	196	123	226	103	--	--	--	103

Table 2.--*Thickness of the Jackson-upper Claiborne confining unit and aggregate thicknesses of clay beds in the confining unit thicker than 10 feet in the Memphis area*--Continued

Well No.	Latitude	Longitude	Altitude	Base of water-table aquifer	Base of Cook Mountain Formation	Thickness of confining unit	Clay bed top	Clay bed bottom	Clay bed thickness	Clay bed top	Clay bed bottom	Clay bed thickness	Aggregate thicknesses of clay beds
Sh:P-93	350831	0895656	279	88	191	103	88	105	17	181	191	10	27
Sh:P-94	350913	0895739	248	78	171	93	98	171	73	--	--	--	73
Sh:P-96	351435	0895300	312	67	266	199	106	122	16	174	266	92	108
Sh:P-103	350927	0895950	258	86	246	160	152	246	94	--	--	--	94
Sh:P-113	351439	0895722	301	72	287	215	116	138	22	166	287	121	143
Sh:P-114	351449	0895641	232	46	209	161	101	209	108	--	--	--	108
Sh:P-115	351327	0895658	292	43	268	225	43	80	37	142	268	126	163
Sh:P-116	351411	0895748	290	51	270	219	140	160	20	204	270	66	86
Sh:P-117	351409	0895709	245	38	205	167	112	205	93	--	--	--	93
Sh:P-118	351458	0895747	265	58	294	236	168	294	126	--	--	--	126
Sh:P-143	351058	0895739	229	50	258	208	68	88	20	192	258	66	86
Sh:Q-1	350900	0894822	330	66	103	37	66	103	37	--	--	--	37
Sh:Q-7	350940	0894504	313	40	101	61	40	101	61	--	--	--	61
Sh:Q-8	350901	0895113	270	32	144	112	80	144	64	--	--	--	64
Sh:Q-16	350909	0895153	260	48	121	73	48	121	73	--	--	--	73
Sh:Q-21	351215	0895127	295	90	210	120	107	210	103	--	--	--	103
Sh:Q-22	351144	0895044	305	81	136	55	81	136	55	--	--	--	55
Sh:Q-23	351136	0895207	283	66	186	120	86	186	100	--	--	--	100
Sh:Q-24	351315	0895150	281	27	205	178	123	205	82	--	--	--	82
Sh:Q-27	351216	0895103	288	65	166	101	65	166	101	--	--	--	101
Sh:Q-30	351113	0895145	295	78	185	107	78	91	13	140	185	45	58
Sh:Q-34	351055	0895208	273	93	171	78	154	171	17	--	--	--	17
Sh:Q-39	351128	0895130	309	81	152	71	81	95	14	120	152	32	46
Sh:Q-42	351127	0895105	309	78	145	67	120	145	25	--	--	--	25
Sh:Q-66	351155	0895142	281	49	130	81	82	130	48	--	--	--	48
Sh:Q-74	351223	0895221	285	82	154	72	97	108	11	112	154	42	53
Sh:Q-82	351326	0895046	322	60	163	103	85	102	17	142	163	21	38
Sh:Q-88	350733	0894825	262	41	118	77	50	118	68	--	--	--	68
Sh:Q-89	350737	0894856	259	31	49	18	31	49	18	--	--	--	18
Sh:Q-90	350749	0895058	247	54	58	4	54	58	4	--	--	--	4
Sh:Q-124	350822	0895003	273	33	60	27	33	60	27	--	--	--	27
Sh:Q-125	350817	0895035	250	37	66	29	37	66	29	--	--	--	29
Sh:Q-130	350835	0894994	320	56	81	25	56	81	25	--	--	--	25
Sh:R-5	351350	0894425	395	35	252	217	54	78	24	126	152	26	
							171	252	81	--	--	--	131
Sh:R-8	351141	0894411	372	34	174	140	68	80	12	86	106	20	
							142	174	32	--	--	--	64
Sh:R-9	351248	0894053	375	40	121	81	57	121	64	--	--	--	64
Sh:R-10	350841	0893940	375	56	56	0	--	--	--	--	--	--	0
Sh:R-15	351239	0893943	342	26	112	86	54	112	58	--	--	--	58
Sh:R-21	350913	0894338	305	46	59	13	46	59	13	--	--	--	13
Sh:R-22	350843	0894240	370	42	98	56	42	98	56	--	--	--	56

Table 2.--*Thickness of the Jackson-upper Claiborne confining unit and aggregate thicknesses of clay beds in the confining unit thicker than 10 feet in the Memphis area*--Continued

Well No.	Latitude	Longitude	Altitude	Base of water-table aquifer	Base of Cook Mountain Formation	Thickness of confining unit	Clay bed top	Clay bed bottom	Clay bed thickness	Clay bed top	Clay bed bottom	Clay bed thickness	Aggregate thicknesses of clay beds
Sh:R-23	350848	0894355	340	48	114	66	48	114	66	--	--	--	66
Sh:R-24	350811	0894244	330	45	110	65	45	110	65	--	--	--	65
Sh:R-25	350737	0894342	276	31	78	47	31	78	47	--	--	--	47
Sh:R-26	351402	0893935	265	31	92	61	31	92	61	--	--	--	61
Sh:R-28	350848	0894316	360	34	87	53	34	84	53	--	--	--	53
Sh:R-29	350835	0894341	315	48	107	59	48	107	59	--	--	--	59
Sh:R-30	350811	0894309	325	40	120	80	80	120	40	--	--	--	40
Sh:T-6	351505	0900322	290	165	326	161	296	326	30	--	--	--	30
Sh:T-7	352040	0900154	400	89	420	321	99	120	21	136	206	70	
							209	219	10	288	296	10	
							326	420	92	--	--	--	203
Sh:T-13	352213	0900056	400	90	454	364	123	166	43	228	262	34	
							367	454	87	--	--	--	164
Sh:T-16	352044	0900249	355	102	398	296	112	150	38	321	337	16	
							344	398	54	--	--	--	108
Sh:T-17	351747	0900329	330	92	448	356	110	159	49	182	243	61	
							305	323	18	385	448	63	191
Sh:T-18	352127	0900107	391	75	450	375	120	148	28	366	450	84	112
Sh:U-1	352113	0895706	284	68	216	148	154	216	62	--	--	--	62
Sh:U-5	352057	0895727	268	79	232	153	172	232	60	--	--	--	60
Sh:U-12	351705	0895320	238	92	180	88	92	180	88	--	--	--	88
Sh:U-19	351603	0895840	242	73	207	134	105	118	13	130	207	77	90
Sh:U-22	351737	0895749	300	80	226	166	98	109	11	124	166	42	
							171	226	55	--	--	--	108
Sh:U-29	351556	0895859	242	71	194	123	109	194	85	--	--	--	85
Sh:U-48	352114	0895727	287	74	152	78	80	152	72	--	--	--	72
Sh:U-49	352023	0895627	251	50	155	105	82	155	73	--	--	--	73
Sh:U-52	352038	0895708	257	54	198	144	102	114	12	124	158	34	
							174	198	24	--	--	--	70
Sh:U-54	352034	0895345	265	74	212	138	74	94	20	152	166	14	
							192	212	20	--	--	--	54
Sh:U-55	352036	0895334	265	96	216	120	137	150	13	166	182	16	
							204	216	12	--	--	--	41
Sh:U-56	351907	0895709	292	60	230	170	178	230	52	--	--	--	52
Sh:U-58	352024	0895257	265	68	174	108	68	174	108	--	--	--	108
Sh:U-59	352009	0895253	265	97	164	67	97	164	67	--	--	--	67
Sh:U-60	352027	0895232	292	88	204	116	148	204	56	--	--	--	56
Sh:V-4	352044	0895219	283	78	205	127	78	110	32	160	205	45	77
Sh:V-7	351544	0894618	278	27	177	150	27	72	45	124	177	53	98
Sh:V-9	352012	0895038	273	60	222	162	150	222	72	--	--	--	72
Sh:V-10	352010	0895038	271	63	185	122	118	144	28	150	185	35	63
Sh:V-16	351904	0894900	283	61	164	103	94	134	40	--	--	--	40
Sh:V-17	351850	0894935	282	63	180	117	120	180	60	--	--	--	60
Sh:V-24	352227	0895043	375	69	362	293	255	362	107	--	--	--	107

Table 2.--*Thickness of the Jackson-upper Claiborne confining unit and aggregate thicknesses of clay beds in the confining unit thicker than 10 feet in the Memphis area*--Concluded

Well No.	Latitude	Longitude	Altitude	Base of water-table aquifer	Base of Cook Mountain Formation	Thickness of confining unit	Clay bed top	Clay bed bottom	Clay bed thickness	Clay bed top	Clay bed bottom	Clay bed thickness	Aggregate thicknesses of clay beds
Sh:W-3	351750	0893943	279	49	66	17	49	66	17	--	--	--	17
Sh:W-7	352026	0894408	322	31	202	171	31	44	13	49	60	11	
							102	202	100	--	--	--	124
Sh:W-13	351938	0894130	320	42	147	105	84	147	63	--	--	--	63
Sh:W-16	351923	0894228	364	44	216	172	44	113	69	124	216	92	161
Tp:E-3	352641	0894721	441	102	411	309	160	194	34	338	411	73	107
Tp:F-3	352517	0894124	405	55	296	241	210	296	86	--	--	--	86

contamination of the ground water presently is known at these sites, or investigations of the sites have not progressed to the stage where groundwater contamination has been determined.

All of the above sources have potential for contaminating the water-table aquifers. Work in determining the degree and extent of contamination of the water-table aquifers is still in the beginning stage, although much progress has been made in recent years. The Memphis aquifer is a step removed from these potential sources of contamination inasmuch as under "natural" conditions contaminants must enter the water-table aquifers before they enter the Memphis aquifer.

INDICATIONS OF DOWNWARD LEAKAGE TO THE MEMPHIS AQUIFER

Indications that downward leakage from the water-table aquifers to the Memphis aquifer is widespread were provided by Graham and Parks (1986). This previous investigation used a multi-aspect approach that included studies of: (1) areal variations in the thickness of the Jackson-upper Claiborne confining unit that indicated areas where the confining unit is thin or absent, (2) the configuration of the water table that indicated an anomaly in this surface where the water table is depressed because of downward leakage, (3) differences in hydraulic head between the water-table and Memphis aquifers that indicated a general downward gradient, (4) areal and local variations in carbon-14 and tritium concentrations in water from the upper part of the Memphis aquifer that indicated relatively recent water has entered the Memphis aquifer, and (5) deviations from the normal geothermal gradient that indicated the coolest temperatures in areas of intense pumping are at greater depths (as a result of leakage) than in areas away from this pumping. The present investigation, which includes detailed studies of the thickness of the confining unit and the configuration of the water table, has resulted in much refinement of the previous work and identification of several additional areas where leakage is or may be occurring.

Graham and Parks (1986) indicated four general areas in the Memphis urban area (as defined in that report) where the Jackson-upper Claiborne confining unit is thin or absent and a high potential for downward leakage exists. These areas are: (1) in the eastern part along and north of the Wolf River, (2) in the southeastern part along Nonconnah Creek, (3) in the south-central part along Nonconnah and Johns Creeks in the vicinity of the southern part of Sheahan well field, and (4) in the western part in a belt along the Mississippi River. The areas in the eastern and southeastern parts along the Wolf River and Nonconnah Creek are extensions of the outcrop or subcrop belt of the Memphis aquifer into the Memphis urban area. The boundaries of these areas are refined on the maps prepared for the present investigation as the eastern limits of the Jackson-upper Claiborne confining unit (plates 1-4).

The area in a belt along the Mississippi River where the confining bed is shown to be thin or absent by Graham and Parks (1986, figs. 3 and 21) was significantly modified during the present investigation. The extension of the belt north of Memphis where the confining bed was thought to be thin or absent was removed from the present map showing the thickness of the Jackson-upper Claiborne confining unit (plate 1). This modification of the northern extension of the belt is based on a re-correlation of geophysical logs partly as a result of a new geophysical log made in well Sh:O-115 (plate 1). No new information from geophysical logs is available for the southern part of the belt. However, a study by Richardson (1989) indicates that water-quality changes in several wells in the Davis well field are the result of leakage of water from the Mississippi River alluvium to the Memphis aquifer.

Richardson concluded that the confining unit is thin or absent beneath the alluvium west of the Davis well field or that a "window" exists in the confining unit.

The area in the south-central part of the Memphis urban area along Nonconnah and Johns Creeks in the vicinity of the southern part of the Sheahan well field has the most information to indicate that downward leakage from the water-table aquifers to the Memphis aquifer is occurring. Indications given by Parks and Graham (1986) include: (1) a loss of water along the stretch of Nonconnah Creek south and southeast of the southern part of Sheahan well field, (2) an adjacent area to the southeast where the confining unit is thin or absent, (3) a depression in the water-table surface, (4) long-term water-level declines in shallow observation well Sh:K-75, (5) carbon-14 and tritium concentrations indicating the presence of relatively recent water in the Memphis aquifer, (6) a distorted geothermal gradient with the coolest temperature at a depth of 230 feet below land surface, and (7) head differences between the water-table and Memphis aquifers favoring downward movement of water. The area where the confining unit is thin or absent is shown on plate 1 as the large area southeast of the southern part of Sheahan well field and west of Lichterman well field. This area is enlarged from the area shown by Graham and Parks (1986, fig. 3), based partly on a new geophysical log of the test hole for well Sh:K-148 in the western part of Lichterman well field (plate 1). The depression in the water-table aquifer, shown on plate 2 as the area extending from the southern part to the northern part of Sheahan well field, also is enlarged from the area shown by Graham and Parks (1986, fig. 7), based partly on the water level in new observation well Sh:K-137.

New information from test holes for wells drilled in the northern part of Sheahan well field since the Graham and Parks report (1986) indicates an area west of that part of the well field with a high potential for leakage. The Jackson-upper Claiborne confining unit in this area is shown by Graham and Parks (1986, fig. 3) to be about 150 feet thick. The stratigraphy of the Sheahan well field is complex and faults may exist. The tops of at least two sand beds in the geologic sequence can be interpreted on geophysical logs as being the top of the Memphis Sand and two clay beds can be interpreted as being the Cook Mountain Formation. The top of the shallower clay bed underlies the fluvial deposits and varies in thickness, but it commonly is thin. The deeper clay bed is thick and seems to be persistent throughout the area. Consequently, during the Graham and Parks investigation, the lower clay was interpreted to be the Cook Mountain Formation and the underlying (deeper) sand to be at the top of the Memphis Sand. During 1986 and 1987, test holes for several new MLGW production wells were drilled in the northern part of Sheahan well field. The geophysical and driller's logs for the test hole for well Sh:K-142 (plate 1) indicate that the confining unit, if present, consisted of only about 6 feet of sandy clay (or clayey sand) overlying a thick interval of sand in the Memphis Sand. In addition, the geophysical log of well Sh:K-141 (plate 1), drilled at the Tennessee Earthquake Information Center for installation of a seismic instrument, indicated that the Cook Mountain Formation may be the shallower clay and that the top of the Memphis Sand may be at the top of the shallower sand. Based on this new information, a re-correlation of the geophysical logs available for the northern part of the Sheahan well field and surrounding areas indicates that the confining unit is thin or absent in an area west of the northern part of the well field (plate 1). This area of high potential for leakage is consistent with a depression in the water table as indicated by a deeper than expected water level in observation well Sh:K-137 (plate 2) installed at the Sheahan pumping station in 1986. In addition, in an area between the Sheahan and Allen well fields (defined by the 160-foot contour on plate 3), the potentiometric surface of the

Memphis aquifer is higher than would be expected when considering the intense pumping at these well fields. This "high" in the potentiometric surface may be the result of leakage from the water-table aquifers in the area where the confining unit is thin or absent (plate 1).

A new area of leakage from the water-table aquifers to the Memphis aquifer identified since the Graham and Parks (1986) report is just north and northeast of the Shelby County landfill (plate 4). During an investigation of the area to satisfy requirements of the TDHE, Division of Solid Waste Management, for expansion of the landfill, water levels in auger holes and observation wells drilled in the vicinity of the landfill indicated that the water table is depressed to levels below low-flow stages of the nearby Wolf River (J.L. Ashner, TDHE, oral commun., 1986). Subsequently, the USGS investigated the geohydrology of the area with emphasis on determining the effects of vertical leakage and leachate migration on the ground-water quality. The results of the investigation indicate that (1) the depression in the water table is centered just north or northeast of the landfill and is as much as 14 feet below the low-flow stages of the Wolf River, (2) a downstream loss of water from the Wolf River occurs along the stretch that flows past the landfill, (3) leachate from the landfill has entered the Wolf River alluvium and is moving northward toward the depression in the water table, and (4) uncontaminated water from the alluvium has entered the Memphis aquifer (M.W. Bradley, USGS, written commun., 1989). The map of the thickness of the Jackson-upper Claiborne confining unit indicates an area in the vicinity and east of the landfill where the confining unit is thin or absent. This is based partly on the geophysical log of well Sh:Q-90 drilled for the landfill investigation (plate 1). A depression in the water table is defined by the 220-foot contour on the map of the altitude of the water table in the alluvium and fluvial deposits. The center of this depression is near well Sh:Q-128 installed for the landfill investigation (plate 2).

New areas identified during the present investigation where the Jackson-upper Claiborne confining unit is thin or absent or where depressions are in the water table include: (1) in the southeastern part of Lichterman well field based on the geophysical log for well Sh:L-102 (plate 1), (2) in the vicinity of McCord well field based on an area east of the well field along Fletcher Creek where the confining bed is interpreted to be thin or absent (plate 1) and the lower than expected water levels in wells Sh:Q-86 and Sh:Q-94 (plate 2), (3) south of Nonconnah Creek and between Interstate 55 and U.S. Highway 78 based on the geophysical log of well Sh:K-143 (plate 1) and the lower than expected water levels in wells Sh:K-144 and Sh:K-145 (plate 2), and (4) west of Olive Branch based on the geophysical log of well Ms:C-17 (plate 1). These newly identified areas have a high potential for downward leakage from the water-table aquifers to the Memphis aquifer.

POTENTIAL FOR CONTAMINATION OF THE MEMPHIS AQUIFER

A sequence of events that would result in contamination of the Memphis aquifer under "natural" conditions is: (1) contaminants enter the water-table aquifers; (2) contaminants are transported downward through the Jackson-upper Claiborne confining unit or enter the Memphis aquifer directly in areas where the confining unit is absent; and (3) contaminants persist despite the effects of various physical, chemical, and biological processes, including dilution and adsorption. Other events that would result in contamination of the Memphis aquifer include: (1) contaminated water in the water-table aquifers leaks downward through faulty well seals (cement grout or backfill material) outside the casings of wells screened in the Memphis aquifer and (2) contaminants from spills, vandalism, or illegal waste disposal enter the casings of wells screened in the Memphis aquifer.

Based on "natural" conditions, the potential for contamination of the Memphis aquifer generally is least in the northern and west-central parts of the Memphis area where the confining bed is thickest and contains much clay, and is greatest in the southern and eastern parts where the confining bed is thin or absent (plate 1). The Jackson-upper Claiborne confining unit is as much as 375 feet thick in the northwestern part of the Memphis area in well Sh:T-18 (plate 1). In this area, the confining unit consists of fine sand, silt, clay, and lignite in the Jackson, Cockfield, and Cook Mountain Formations. The confining unit is absent in the southeastern part of the Memphis area in wells Sh:M-17, Sh:M-43, and Sh:R-10 (plate 1). Aggregate thickness of clay beds within the confining unit thicker than 10 feet is greatest in the west-central part of the Memphis area. In the Mallory well field, an aggregate thickness of clay beds thicker than 10 feet makes up 246 feet of the total thickness of 255 feet for the confining unit in well Sh:O-184 (plate 1).

Sites where the water-table and Memphis aquifers are reported to contain contaminants and areas where the Jackson-upper Claiborne confining bed is thin or absent are shown on plate 4. Thus far, 44 sites have been identified where contaminants have been detected in the water-table aquifers (table 6). Many of these sites, which are potential sources of contamination of the Memphis aquifer, are located in areas where the direction of ground-water flow in the Memphis aquifer is toward cones of depression at MLGW well fields (plate 3). Based on present (1989) information, the Allen well field has the most sites in close proximity. Some sites also are located in areas where the confining unit is thin or absent or in areas where the direction of flow in the water-table aquifers is toward these areas (plate 2). It is likely that additional sites where the water-table aquifers are contaminated will be found as monitoring and investigations continue.

Thus far, only two sites have been found where volatile organic compounds have been detected in the Memphis aquifer—wells Sh:J-119 (398 feet deep), Sh:J-120 (452 feet) and Sh:J-121 (436 feet) in the Allen well field at Memphis and wells Sh:M-31 (324 feet) and Sh:M-35 (287 feet) in the west well field at Collierville (plate 4). Volatile organic compounds detected in wells Sh:J-119 and Sh:J-120 are: 1,1-dichlorethane, 1,1-dichloroethylene, cis-1,2-dichloroethylene, 1,2-dichloropropane, 1,2-dichloroethene, trichloroethylene, and vinyl chloride. Concentrations of these compounds ranged from 0.02 to 5.52 $\mu g/L$ in these two wells—the highest concentration was for 1,2-dichloroethane detected in a sample collected from well Sh:J-120. The concentrations of the seven compounds in a sample from this well totaled about 11 $\mu g/L$ (J.H. Webb, MLGW, written commun., 1988). Well Sh:J-120 is about 650 feet and well Sh:J-119 is about 2,000 feet from the nearest known potential source of contamination in the water-table aquifers (site 34, plate 4; table 6). The wells in the Allen well field are in an area where the confining unit is as thin as 82 feet and contains as little as 68 feet of aggregate thickness of clay beds thicker than 10 feet, based on the geophysical log of well Sh:J-119 (plate 1). Driller's logs for wells Sh:J-120 and Sh:J-121 provide no indication that a sand "window" exists in this area, although it is possible.

The volatile organic compound detected in water from wells Sh:M-31 and Sh:M-35 at Collierville is trichloroethylene. Since August 1988, these two municipal wells have been sampled periodically to determine concentrations of trichloroethylene. Concentrations detected have ranged from 1.6 to 25.0 $\mu g/L$ with the highest concentration in a sample collected from well Sh:M-35 (B.J. Maness, TDHE, written commun., 1989). These wells are about 2,000 feet from the nearest known potential source of contamination (site 44, plate 4; table 6). The wells at Collierville are east of the eastern limits of the Jackson-upper Claiborne confining unit

(plate 4). However, the driller's logs for wells Sh:M-31 and Sh:M-35 indicate at least 60 feet of clay in the Memphis aquifer separating the water-table aquifers from sand in the Memphis aquifer.

The facts that these volatile organic compounds (1) have been transported through the Jackson-upper Claiborne confining unit or through (or around) relatively thick intervals of clay in the Memphis aquifer, (2) have persisted despite the effects of various physical, chemical, and biological processes, and (3) have been detected in wells ranging from 287 to 452 feet in depth at distances as far as 2,000 feet from the nearest known potential sources of contamination in the water-table aquifers, emphasize the vulnerability of the Memphis aquifer to contamination.

Recently (1987-88), MLGW began a yearly routine sampling of all of their production wells in the Memphis aquifer and analytical "scans" of the water to determine the presence of organic compounds. If unidentified organic compounds are detected, a follow-up analysis is conducted to identify specific compounds. The results of the first sampling of all production wells indicated that only the water from the three wells in the Allen well field contained contaminants (J.H. Webb, MLGW, oral commun., 1989).

SUMMARY AND CONCLUSIONS

The City of Memphis presently (1989) depends solely on the Memphis aquifer for its water supply. Withdrawals from the Memphis aquifer in the Memphis area for municipal, industrial, and commercial uses totaled about 200 Mgal/d in 1988. Historically, the Memphis aquifer was thought of as an ideal aquifer overlain by a thick, impermeable clay layer that serves as a confining unit and protects the aquifer from contamination from near-surface sources. Studies in recent decades (1964-86), however, indicate that the confining unit locally may be thin or absent and may contain sand "windows" that could provide "pathways" for contaminants to reach the Memphis aquifer. Studies also indicate that downward leakage from the water-table aquifers (alluvium and fluvial deposits) to the Memphis aquifer is widespread in the Memphis area.

Indications of areas where downward leakage from the water-table aquifers to the Memphis aquifer is or may be occurring that were recognized during the previous and present investigations are as follows:

- areas where the confining unit is thin or absent and downward leakage can occur directly from the water-table aquifers to the Memphis aquifer;
- differences in hydraulic head between the water-table aquifers and the Memphis aquifer indicate a general downward gradient in most of the Memphis area;
- local depressions in the water-table surface indicate that leakage from the water-table aquifers to the Memphis aquifer is occurring;
- long-term declines and reduced seasonal fluctuations in observation wells in the water-table aquifers indicate that leakage is occurring;
- downstream losses of water along a stretch of a major stream based on a series of discharge measurements made during low-flow conditions indicate that leakage is occurring;
- areal and local variations in carbon-14 and tritium concentrations in water from the Memphis aquifer show the presence of relatively recent water, indicating leakage;

- local deviations in geothermal gradient in areas of intense pumping indicate that shallow subsurface temperatures in the water-table aquifers, confining unit, and Memphis aquifer are warmer than expected as a result of leakage;

- water-quality anomalies and changes in water quality in the Memphis aquifer indicate downward leakage from the water-table aquifers to the Memphis aquifer; and

- volatile organic compounds detected in water from the Memphis aquifer indicate that contaminants in water from the water-table aquifers has reached the Memphis aquifer.

Detailed maps of the thickness of the confining unit and the altitude of the water table in the alluvium and fluvial deposits prepared during the present investigation have provided much refinement of previously identified areas of downward leakage. Several new areas where downward leakage is or may be occurring also have been identified. Maps showing the altitude of the potentiometric surface of the Memphis aquifer and the locations of 44 sites where contaminants have been detected in the water-table aquifers indicate that many potential sources of contamination are located in areas where the direction of ground-water flow in the Memphis aquifer is toward cones of depression at MLGW well fields. Based on present information, the MLGW Allen well field has the most sites in close proximity. The water-table map also indicates that some of the sites where contaminants have been detected are in areas where the confining unit is thin or absent or in areas where the direction of flow in the water-table aquifer is toward these areas.

Recently, (1986-88) volatile organic compounds were detected in water from five municipal wells in the Memphis area—three in the MLGW Allen well field at Memphis and two in the west well field at Collierville. Concentrations totaled about 11.0 μg/L for seven compounds in a sample from one of the wells at the Allen well field and 25.0 μg/L for one compound in a sample from one of the wells at Collierville.

The facts that volatile organic compounds (1) have been transported downward through the confining unit or through (or around) relatively thick intervals of clay in the Memphis aquifer; (2) have persisted despite the effects of various physical, chemical, and biological processes; and (3) have been detected in wells ranging from 257 to 452 feet in depth at distances as far as 2,000 feet away from the nearest known potential source of contamination in the water-table aquifers, emphasize the vulnerability of the Memphis aquifer to contamination.

REFERENCES

Bell, E.A., and Nyman, D.J., 1968, Flow pattern and related chemical quality of ground water in the "500-foot" sand in the Memphis area, Tennessee: U.S. Geological Survey Water-Supply Paper 1853, 27 p.

Brahana, J.V., 1982, Two-dimensional digital groundwater model of the Memphis Sand and equivalent units, Tennessee, Arkansas, Mississippi: U.S. Geological Survey Open-File Report 82-99, 55 p.

Brahana, J.V., Parks, W.S., and Gaydos, M.W., 1987, Quality of water from freshwater aquifers and principal well fields in the Memphis area, Tennessee: U.S. Geological Survey Water-Resources Investigations Report 87-4052, 22 p.

Criner, J.H., and Armstrong, C.A., 1958, Ground-water supply of the Memphis area: U.S. Geological Survey Circular 408, 20 p.

Criner, J.H., and Parks, W.S., 1976, Historic water-level changes and pumpage from the principal aquifers of the Memphis area, Tennessee: 1886-1975: U.S. Geological Survey Water-Resources Investigations Report 76-67, 45 p.

Criner, J.H., Sun, P-C.P., and Nyman, D.J., 1964, Hydrology of the aquifer systems in the Memphis area, Tennessee: U.S. Geological Survey Water-Supply Paper 1779-O, 54 p.

Cushing, E.M., Boswell, E.H., and Hosman, R.L., 1964, General geology of the Mississippi embayment: U.S. Geological Survey Professional Paper 448-B, 28 p.

Dalsin, G.J, and Bettandorff, J.M., 1976, Water for industrial and agricultural development in Coahoma, DeSoto, Panola, Quitman, Tate, and Tunica Counties, Mississippi: Mississippi Research and Development Center, 87 p.

Fenneman, N.M., 1938, Physiography of eastern United States: New York, McGraw-Hill, 714 p.

Glenn, L.C., 1906, Underground waters of Tennessee and Kentucky west of Tennessee River and of an adjacent area in Illinois: U.S. Geological Survey Water-Supply Paper 164, 173 p.

Graham, D.D., 1979, Potentiometric map of the Memphis Sand in the Memphis area, Tennessee, August 1978: U.S. Geological Survey Water-Resources Investigations Report 79-80, scale 1:125,000, 1 sheet.

—— 1982, Effects of urban development on the aquifers in the Memphis area Tennessee: U.S. Geological Survey Water-Resources Investigations Report 82-4024, 20 p.

—— 1985, Test well installation and water quality, Hollywood Dump area, Memphis, Tennessee: U.S. Geological Survey Water-Resources Investigations Report 84-4212, 35 p.

Graham, D.D., and Parks, W.S., 1986, Potential for leakage among principal aquifers in the Memphis area, Tennessee: U.S. Geological Survey Water-Resources Investigations Report 85-4295, 46 p.

Grubb, H.F., 1984, Planning report for the Gulf Coast Regional Aquifer-System Analysis in the Gulf of Mexico Coastal Plain, United States: U.S. Geological Survey Water-Resources Investigations Report 84-4219, 30 p.

Hosman, R.L., 1988, Geohydrologic framework of the Gulf Coastal Plain: U.S. Hydrologic Atlas HA-695, 2 sheets.

Kazmann, R.G., 1944, The water supply of the Memphis area, A progress report: U.S. Geological Survey, 66 p.

Lanphere, C.R., 1955, Geologic source and chemical quality of public ground-water supplies in western Tennessee: Tennessee Division of Geology Report of Investigations no. 1, 69 p.

McMaster, B.W., and Parks, W.S., 1988, Concentrations of selected trace inorganic constituents and synthetic organic compounds in the water-table aquifers in the Memphis area, Tennessee: U.S. Geological Survey Open-File Report 88-485, 23 p.

Nyman, D.J., 1965, Predicted hydrologic effects of pumping from the Lichterman well field in the Memphis area, Tennessee: U.S. Geological Survey Water-Supply Paper 1819-B, 26 p.

Parks, W.S., 1973, Geologic map of the Southwest Memphis quadrangle, Tennessee: U.S. Geological Survey open-file report, scale 1:24,000.

—— 1975, Geologic map of the Germantown quadrangle, Tennessee: U.S. Geological Survey open-file report, scale 1:24,000.

—— 1977, Geologic map of the Ellendale quadrangle, Tennessee: U.S. Geological Open-File Report 77-752, scale 1:24,000.

—— 1978, Geologic map of the Tennessee portion of the Fletcher Lake quadrangle, Tennessee (including portions of adjacent quadrangles to the north, west,

and south): Tennessee Division of Geology GM 404-SW, scale 1:24,000.

----- 1979a, Geologic map of the Northeast Memphis quadrangle, Tennessee: U.S. Geological Survey Open-File Report 79-1268, scale 1:24,000.

----- 1979b, Geologic map of the Tennessee portion of the Northwest Memphis quadrangle, Tennessee: U.S. Geological Survey Open-File Report 79-1269, scale 1:24,000.

----- 1987a, Geologic map of the Southeast Memphis quadrangle, Tennessee (including the Tennessee part of the Pleasant Hill quadrangle, Tennessee-Mississippi): Tennessee Division of Geology GM 409-SW, scale 1:24,000.

----- 1987b, Indications of downward leakage from the water-table aquifers to the principal artesian aquifer at Memphis, Tennessee: Proceedings of the Mississippi Water Resources Conference, Jackson, Mississippi, March 25-26, 1987, p. 95-97.

Parks, W.S., and Carmichael, J.K., 1989, Geology and ground-water resources of the Fort Pillow Sand in western Tennessee: U.S. Geological Survey Water-Resources Investigations Report 89-4120, 20 p.

----- 1990a, Geology and ground-water resources of the Memphis Sand in western Tennessee: U.S. Geological Survey Water-Resources Investigations Report 88-4182, 30 p.

----- 1990b, Geology and ground-water resources of the Cockfield Formation in western Tennessee: U.S. Geological Survey Water-Resources Investigations Report 88-4181, 17 p.

----- 1990c, Potentiometric surface, fall 1985, and water-level changes in the Memphis aquifer in western Tennessee: U.S. Geological Water-Resources Investigations Report 88-4180, 8 p.

Parks, W.S., Carmichael, J.K., and Graham, D.D., 1985, Preliminary assessment of ground-water resources of Lauderdale County, Tennessee: U.S. Geological Survey Water-Resources Investigations Report 84-4104, 35 p.

Parks, W.S., Graham, D.D., and Lowery, J.F., 1982, Installation and sampling of observation wells and analyses of water from the shallow aquifer at selected waste-disposal sites in the Memphis area, Tennessee: U.S. Geological Survey Open-File Report 82-266, 32 p.

Parks, W.S., and Lounsbury, R.W., 1976, Summary of some current and possible future environmental problems related to geology and hydrology at Memphis, Tennessee: U.S. Geological Survey Water-Resources Investigations Report 4-76, 34 p.

Plebuch, R.O., 1961, Fresh-water aquifers of Crittenden County, Arkansas: Arkansas Geology and Conservation Commission Water Resources Circular no. 8, 65 p.

Richardson, G.J., 1989, A study of potential sources of leakage into the Memphis Sand aquifer beneath the Davis well field in Memphis, Tennessee: Memphis, Tennessee, Memphis State University, unpublished thesis, 82 p.

Rima, D.R., 1979, Susceptibility of the Memphis water supply to contamination from the pesticide waste disposal site in northeastern Hardeman County, Tennessee: U.S. Geological Survey Open-File Report 79-750, 5 p.

Safford, J.M., 1890, The water supply of Memphis: Tennessee Board of Health Bulletin v. 5, 93 p.

Schneider, Robert, and Cushing, E.M., 1948, Geology and water-bearing properties of the "1,400-foot" sand in the Memphis area: U.S. Geological Survey Circular 33, 13 p.

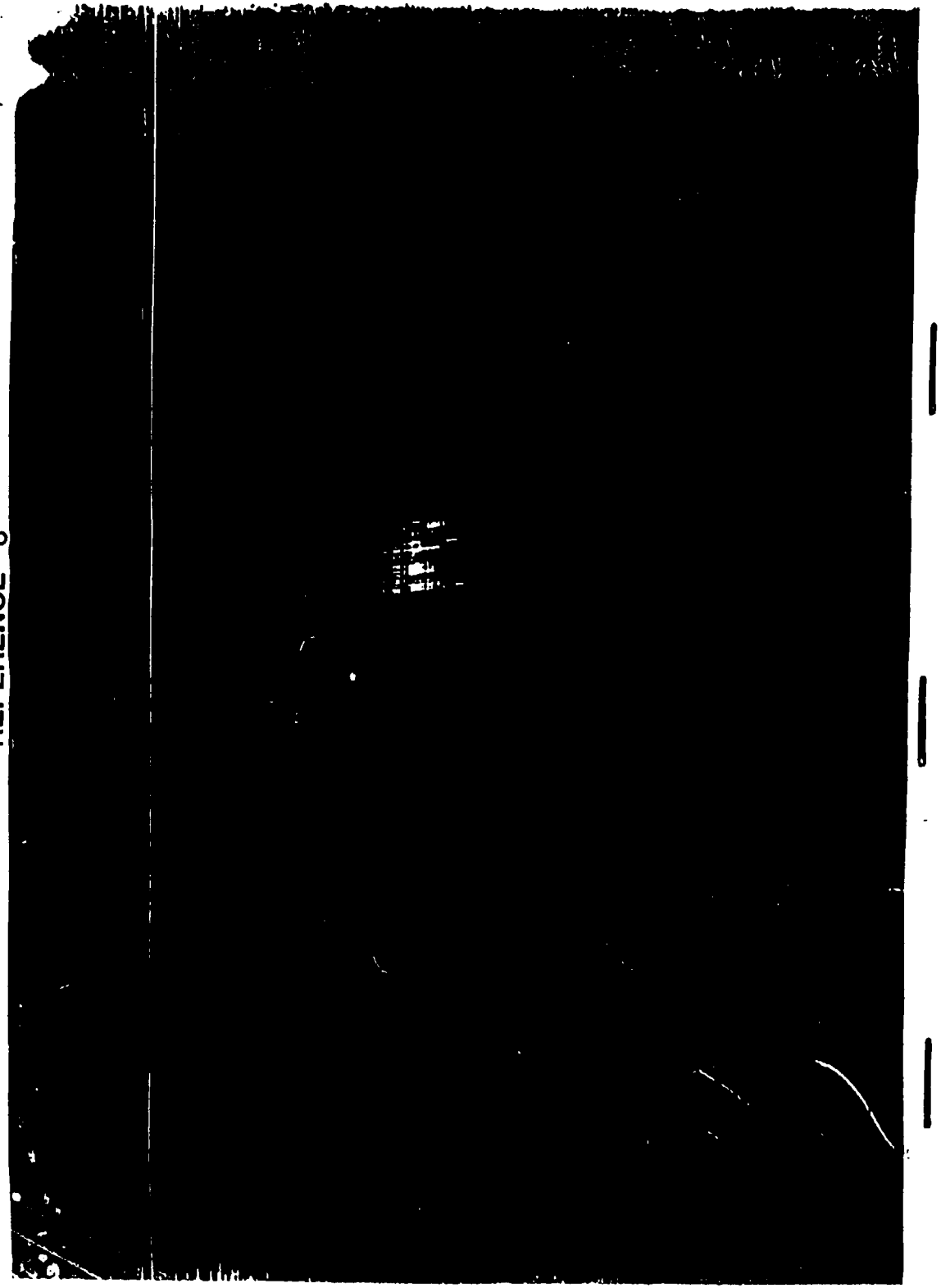
U.S. Army Corps of Engineers, Memphis District, 1981, Memphis metropolitan urban area water resources study: Memphis, Tennessee, U.S. Army Corps of Engineers, 127 p.

U.S. Environmental Protection Agency, 1986, Maximum contaminant levels (subpart B of part 141, National interim primary drinking-water regulations): U.S. Code of Federal Regulations, Title 40, Parts 100 to 149, revised July 1, 1986, p. 524-528.

Wells, F.G., 1931, A preliminary report on the artesian water supply of Memphis, Tennessee: U.S. Geological Survey Water-Supply Paper 638-A, 34 p.

----- 1933, Ground-water resources of western Tennessee, *with a discussion of* Chemical character of the water by F.G. Wells and M.D. Foster: U. S. Geological Survey Water-Supply Paper 656, 319 p.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1991—549-055



Hydrology of Aquifer Systems in the Memphis Area, Tenness

By J. H. CRINER, P.-C. P. SUN, and D. J. NYMAN

CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1

Prepared in cooperation with the city of Memphis, Memphis Light, Gas, and Water Division

A hydrogeologic delineation, analysis, and evaluation of the principal water-bearing formations in the Memphis area, Tennessee

U. S. Geological Survey

UNITED STATES DEPARTMENT OF THE INTERIOR

STEWART L. UDALL, *Secretary*

GEOLOGICAL SURVEY

Thomas B. Nolan, *Director*

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. [illegible]

CONTENTS

ILLUSTRATIONS

[Plates are in pocket]

TABLES

CONTRIBUTIONS TO THE HYDROLOGY OF THE UNITED STATES

HYDROLOGY OF AQUIFER SYSTEMS IN THE MEMPHIS AREA, TENNESSEE

By J. H. Criner, P-C. P. Sun, and D. J. Nyman

ABSTRACT

The Memphis area as described in this report comprises about 1,300 square miles of the Mississippi embayment part of the Gulf Coastal Plain. The area is underlain by as much as 3,000 feet of sediments ranging in age from Cretaceous through Quaternary.

In 1960, 150 mgd (million gallons per day) of water was pumped from the principal aquifers. Municipal pumpage accounted for almost half of this amount, and industrial pumpage a little more than half. About 90 percent of the water used in the area is derived from the "500-foot" sand, and most of the remainder is from the "1,400-foot" sand; both sands are of Eocene age. A small amount of water for domestic use is pumped from the terrace deposits of Pliocene and Pleistocene age.

Both the "500-foot" and the "1,400-foot" sands are artesian aquifers except in the southeastern part of the area; there the water level in wells in the "500-foot" sand is now below the overlying confining clay. Water levels in both aquifers have declined almost continuously since pumping began, but the rate of decline has increased rapidly since 1940. Water-level decline in the "1,400-foot" sand has been less pronounced since 1955.

The cones of depression in both aquifers have expanded and deepened as a result of the annual increases in pumping, and an increase in hydraulic gradients has induced a greater flow of water into the area. Approximately 135 mgd entered the Memphis area through the "500-foot" sand aquifer in 1960, and, of this amount, 60 mgd originated as inflow from the east and about 75 mgd was derived from leakage from the terrace deposits, from the north, south, and west and from other sources. Of the water entering the "1,400-foot" sand, about 5 mgd was inflow from the east, and about half that amount was from each of the north, south, and west directions. The average rate of movement of water outside the area of heavy withdrawals is about 70 feet per year in the "500-foot" sand and about 40 feet per year in the "1,400-foot" sand. The average rate of depletion of storage in each aquifer since pumping began is about 1 mgd.

Most of the recharge to the "500-foot" and "1,400-foot" sands occurs in outcrop areas about 30–80 miles east of Memphis. Also, water leaks from the terrace deposits to the "500-foot" sand in some places, and there may be some leakage from streams where the confining clay is thin or is breached by faults or streams.

The quality of water from both the principal aquifers is very good. Iron, carbon dioxide, and hydrogen sulfide are the only constituents found in undesirable quantities. Water from the terrace deposits is hard but generally contains less iron and carbon dioxide than water from either of the principal aquifers.

The hydraulic characteristics of both aquifers were determined by pumping tests and by applying the knowledge of the geology of the area; these characteristics indicate that the aquifers are capable of producing more water than is currently being pumped from them. The "500-foot" sand will produce more water per unit decline of water level than will the "1,400-foot" sand. There appears to be no reason why the development of water supplies from both aquifers should not continue, but well spacing will remain a factor which could affect future development. Greater well spacing will tend to prolong the useful life of a well and the aquifers.

INTRODUCTION

In 1960, industrial and municipal supply wells in the Memphis area pumped about 150 million gallons of water a day. Pumping has increased continuously since 1898, the earliest date for which records are available, and the rate of this increase has accelerated greatly since 1940. Decline of water levels has accompanied increases in the pumpage, and in 1928 the city of Memphis began a program of periodic water-level measurements to determine ways to reduce the rate of decline. The U.S. Geological Survey was requested to assist in this study, and a continuing cooperative program of investigations was begun in 1940. Early investigations showed the need for proper spacing of wells, which has been practiced to the present time.

PURPOSE AND SCOPE OF INVESTIGATION

The present investigation was started in 1958 as a quantitative study of the two principal aquifers that supply water to the Memphis area. The objectives were to delineate these aquifers, evaluate their hydraulic characteristics, show the relation between pumpage and water-level change, and determine the factors affecting the economical development and use of ground water. The study was based partly on the premise that the questions posed by Kazmann (1941, p. 17–18) must be answered as completely as possible to provide for orderly development and management of the ground-water resources. These questions are repeated and discussed in the concluding section of this report.

Work consisted of (1) delineation of the "500-foot" and "1,400-foot" sands by a series of subsurface contour maps based on drillers' logs and geophysical logs of wells, (2) collection of water-level records from a network of about 150 observation wells, 55 of which were equipped with automatic recorders, (3) preparation of contour maps showing water levels and the amount of water-level decline in the "500-foot" sand, (4) analyses of pumping tests of wells in both aquifers, (5) determination of the amount of water in storage in each aquifer in the area through each aquifer before development began and during 1960, (6) preparation of a ground-water budget for the "500-foot" sand, based on 1960 records, and (7) inventory of ground-water withdrawal and study of its relation to water-level decline.

LOCATION AND GENERAL FEATURES OF THE AREA

The Memphis area (fig. 1), about 1,300 square miles in this report, includes all Shelby County and parts of Fayette and Tipton Counties, Tenn., and contiguous parts of Arkansas and Mississippi. The area is near the center of the upper half of the Mississippi embayment in the Gulf Coastal Plain.

The climate of the Memphis area is warm and humid, having hot summers, mild winters, and a frost-free period of about 230 days between late March and early November. The average annual temperature is 61.9°F; the hottest month is July, which has an average temperature of 81.1°F; and the coldest month is January, which has an average temperature of 41.5°F.

The average annual rainfall Memphis (fig. 2), based on an 89-year period of record (1872–1960), is 48.48 inches. The maximum annual rainfall recorded was 76.85 inches in 1957, and the minimum was 30.54

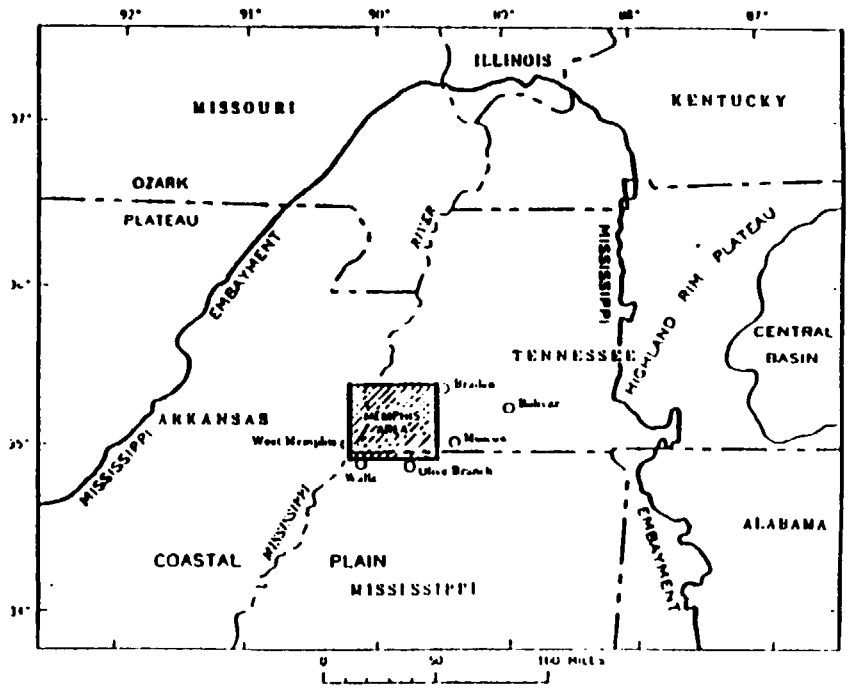


FIGURE 1.—Generalized physiographic map of the northern Mississippi embayment show-

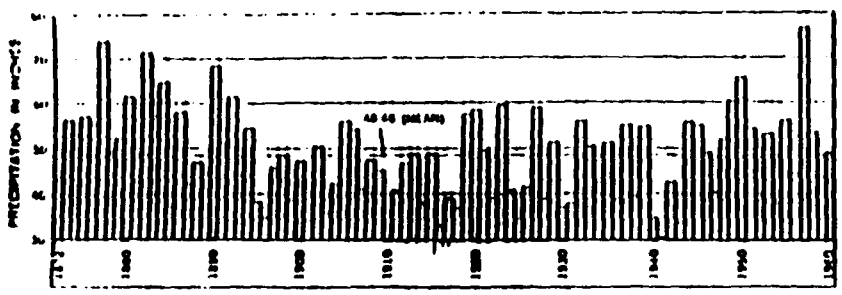


FIGURE 2.—Graph showing annual precipitation at Memphis, Tenn.

inches in 1941. The wet season usually begins in late November and ends in April. Rainfall at Moscow and Bolivar (fig. 1) in the outcrop or recharge area of the principal aquifers, is slightly greater than that in the Memphis area.

The Memphis area (fig. 1) consists mostly of a gently rolling upland ranging in elevation from about 400 feet in the eastern part of Shelby County to about 200 feet on the alluvial plain of the Mississippi River. The maximum topographic relief is about 200 feet, but the local relief of individual topographic features seldom exceeds 40 feet. The upland area is terminated by a bluff 50 to 150 feet high along the eastern margin of the alluvial plain of the Mississippi River. This virtually flat plain, which is approximately 210 feet above sea level, is about 3 miles wide along the east side of the Mississippi River except in the vicinity of Memphis; at Memphis the river flows along the base of the bluff.

The principal streams that drain the Memphis area are the Wolf and Loosahatchie Rivers and Nonconnah Creek, all of which flow north-northwestward and discharge into the Mississippi River. These streams have wide flood plains that are generally adequate to accommodate flood waters during the rainy season. Some sections of the channels of these and smaller tributaries have been artificially deepened for more effective drainage of the lowland areas. In the past all three major streams have flowed throughout the year; however, in recent years Nonconnah Creek was dry in its lower reach for short periods during the dry season from July to October.

Memphis is a large industrial center; the principal industries produce hardwood lumber and cotton and associated products. The Memphis Chamber of Commerce reported 765 industries in Memphis (1958-59), 120 of which have their own water-supply wells. More than half the total ground-water pumpage from the area is from these wells.

The 1960 U.S. Census shows that the population of Memphis and Shelby County has approximately doubled since 1930. The successive census figures are as follows:

Population of Memphis and Shelby County, Tenn.

Year	Memphis	Shelby County
1930	253,143	306,482
1940	292,942	358,250
1950	396,012	482,393
1960	497,524	627,019

PREVIOUS INVESTIGATIONS

The earliest reports describing the geology and the ground-water resources of the Memphis area were by Safford (1869, 1890) and Glenn (1906). Wells (1931) described the artesian water supply of Memphis and, in a subsequent report (1933), the ground-water resources of West Tennessee, including a more detailed discussion of ground-water conditions in the Memphis area. Since the beginning of the cooperative program in 1940, progress reports have been published by Kazmann (1944), Schneider and Cushing (1948), and Criner and Armstrong (1958).

Regional and local studies relating to the geology of the Memphis area were made by Fisk (1944), Caplan (1954), Stearns and Armstrong (1955), and Stearns (1957).

Records of water levels from 1936 through 1955 have been reported by the U.S. Geological Survey (issued annually). Earlier measurements were reported by Wells (1931, 1933).

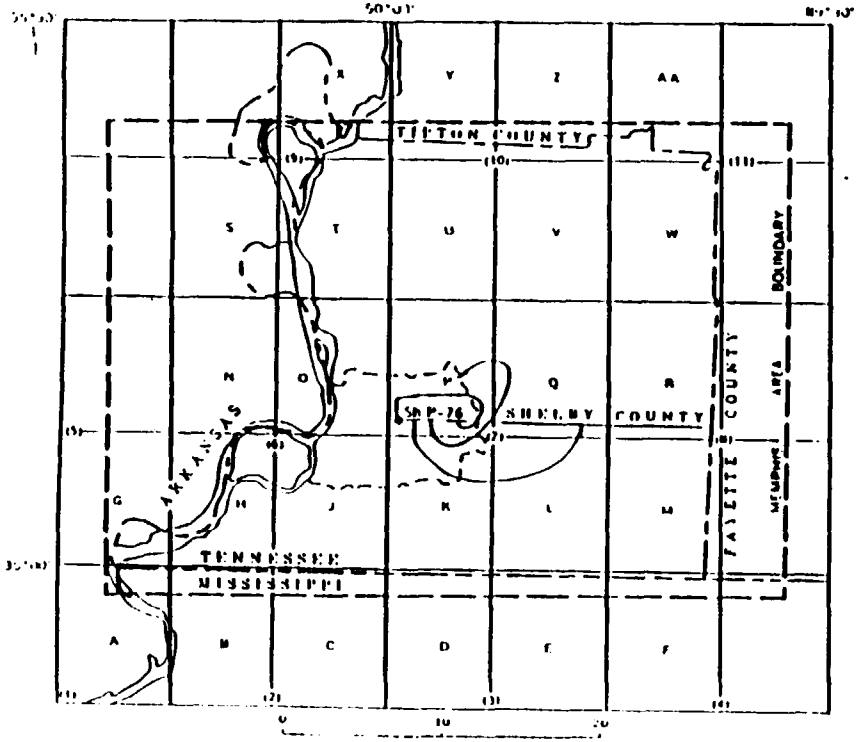
ACKNOWLEDGMENTS

The assistance and cooperation of many city and county officials, industry representatives, drilling contractors, and well owners were helpful in the collection of data for this report. Mr. J. J. Davis, Director, Water Division, and Messrs. A. J. Rumley and Hugh Mills, Memphis Light, Gas, and Water Division, provided essential well and water-use data from the city records and assisted greatly in the investigation. Mr. E. C. Handorf and Mr. W. M. Craddock, of the Memphis and Shelby County Health Department have, through their interest in the Memphis area water supply, contributed substantially to the study. Drilling contractors, industries, and individual well owners also were especially helpful in providing well data, permitting use of wells for geophysical and hydraulic tests, and furnishing information on water use in the area.

WELL-NUMBERING SYSTEM

Figure 3 illustrates the standard system for numbering wells in this report. Each well number consists of of three units: (1) an abbreviation of the name of the county in which the well is located; (2) a letter designating the 7½-minute topographic quadrangle, or 7½-minute quadrant of a 15-minute quadrangle, in which the well is located; and (3) a number generally indicating the numerical order in which the wells were inventoried.

The index map (fig. 3) shows the 15-minute topographic quadrangles of the U.S. Army Corps of Engineers that include Shelby County and adjacent areas described in this report. The example, well Sh: P–76, is in Shelby County, in the northwest quadrant (7½-minute quadrangle designated "P") of the Bartlett 15-minute quadrangle and is identified as well 76 in the numerical sequence.



15-MINUTE TOPOGRAPHIC QUADRANGLES

1 HORSESHOE LAKE (1954) NE¼
2 HORN LAKE (1961) NW¼
3 HERNANDO (1944) NW¼
4 SYLVALIA (1948) NW¼
5 EDMONSON (1951) SE¼
6 MEMPHIS (1961)
7 BARTLETT (1961)
8 COLLIERVILLE (1948) W½
9 JERICHO (1952)
10 MILLINGTON (1961)
11. MASON (1954) W½

In this report the county designation "Sh" is omitted in figures. Well numbers in adjoining counties in Tennessee are preceeded by the county abbreviation. Wells in adjoining States are not numbered.

At Memphis, the Memphis Light, Gas, and Water Division many years ago established their own well-numbering system. According to this plan, blocks of numbers were assigned for the city's five existing well fields (pl. 1) and other blocks of numbers were reserved for future well fields. The block assignments are as follows:

1–49	Parkway Field
50–99	Sheahan Field
100–149	Allen Field
150–199	Miscellaneous wells at scattered locations (abandoned)
200–249	McCord Field
250–299	(Not assigned)
300–349	Hickory Hill (Lichterman) Field (proposed)

Listed below are city-owned wells in use as of January 1962 and those that have been withdrawn from use. Well numbers followed by the letters "A," "B," and so on, indicate first, second, and so on, replacement wells for those withdrawn from use. For convenient reference, the wells owned by the Memphis Light, Gas, and Water Division are listed below, together with the corresponding numbers assigned by the U.S. Geological Survey.

City	Geological Survey	City	Geological Survey	City	Geological Survey
1	Sh:O–125	15A	Sh:O–150	30	Sh:O–175
1A	126	16	151	31	176
2	127	16A	152	32	177
2A	128	17	153	33	178
3	129	18	154	34	179
4	130	19	155	35	180
4A	131	19A	156	36	P– 77
5	132	20	157	37	78
6	133	20B	158	38	O–181
6A	134	21	159	39	182
7	135	21A	160	40	183
7A	136	22	161	41	184
9	137	22A	162	42	185
9A	138	22B	163	43	186
10	139	22C	164	44	187
10A	140	23	165	45	188
11	141	23A	166	46	189
11A	142	24	167	47	190
12	143	24A	168	50	K– 37
12A	144	25	169	51	38
13	145	26	170	52	39
13A	146	26A	171	53	40
14	147	27	172	54	41
14A	148	28	173	54A	42
15	149	29	174	55	43

City	Geological Survey
55A	Sh: K- 44
56	45
57	46
57A	47
57B	48
57C	49
58	50
59	51
60	52
61	53
61A	54
62	55
63	56
64	57
65	58
66	59
67	60
68	61
69	62
70	63
71	64
72	65
73	66
74	P- 79
75	80
76	81
77	K- 67
77A	68
78	P- 82
79	83
80	Sh: P- 84
81	K- 69
82	70
83	71
84	72
85	73
86	74
86S	75
87	76
88	77
101	J- 96
102	97
103	98
104	99
105	100
106	101
107	102
108	103
109	104
110	105
111	106
112	107
113	108
114	109
115	110
116	111
117	112
118	113
121	114
122	115
123	Sh: J- 116
124	117
125	118
126	119
127	120
128	121
130	122
131	123
133	124
134	125
135	126
136	127
137	128
193	P- 76
201	Q- 29
202	30
203	31
204	32
205	33
207	34
208	35
209	36
210	37
218	38
219	39
220	40
221	41
222	42
307	L- 39
324	40

GENERAL GEOLOGY OF THE AQUIFER SYSTEMS

The Memphis area is in the northern part of the East Gulf Coastal Plain, near the axis of the Mississippi embayment structural trough (fig. 1). About 3,000 feet of unconsolidated clay, silt, sand, and gravel has been deposited in this area, and these sediments provide a record of the several invasions and recessions of the sea and the intervening periods of erosion that have occurred since the beginning of Cretaceous time. This wedge-shaped sequence of deposits thickens southward toward the Gulf of Mexico and westward toward the Mississippi River.

Stearns and Armstrong (1955, p. 6-7) and Stearns (1957, p. 1084-1085) described the depositional environmental relations and defined three sedimentary rock types that best illustrate these relations in the northern part of the Mississippi embayment. These types are described briefly as follows:

Back-beach clay and sand.—Back-beach beds consist of light-colored clay, lignite, and discontinuous beds of sand. The clay beds, in contrast with those of a more marine environment, are characterized by the presence of leaf imprints and the general absence of glauconite. These clay and sand deposits are of limited areal extent and therefore cannot be traced easily in the subsurface, even by means of geophysical logs of closely spaced wells. The irregularly interbedded sediments in the upper part of the Claiborne Group (table 1) are typical of the back-beach deposits.

Shallow-water near-shore sand.—Well-sorted sand interbedded with glauconitic and fossiliferous clay is characteristic of the shallow-water near-shore deposits. The sand is areally extensive, in contrast with the back-beach deposits. Where sand beds grade laterally or vertically into back-beach beds, they contain lignite and wood fragments; where they grade into deeper-water clay beds, they contain glauconite. The sandy middle unit ("1,400-foot" sand) of the Wilcox Group (table 1) in the Memphis area is typical of the shallow-water near-shore deposits.

Deeper water clay and shale.—The deeper water clay and shale is medium gray to dark gray and contains marine fossils, calcareous beds, and glauconite. These beds are thick and areally extensive and therefore are easily recognized and traced in the subsurface by means of drillers' logs and geophysical logs of wells. In the Memphis area, typical deposits of this category are the marine facies of the Jackson(?) Formation and the upper clay unit of the Wilcox Group.

DESCRIPTION OF THE GEOLOGIC UNITS

The Memphis area is underlain by about 3,000 feet of clay, silt, sand, and gravel ranging in age from Cretaceous through Recent. These sediments were deposited on the limestone rocks of Paleozoic age that form the bedrock floor of the Mississippi embayment syncline. This report deals primarily with the geology related to the two principal aquifers in the Memphis area, and for this reason only the stratigraphic units of Eocene and younger age are discussed in detail. These units (table 1) include the major aquifers, the "1,400-foot" sand of the Wilcox Group, and the "500-foot" sand of the Claiborne Group (Kazmann, 1948, p. 2).

WILCOX GROUP

On the basis of drillers' logs and geophysical logs of wells in the Memphis area, the Wilcox Group is divided into a lower clay unit, a middle sand unit ("1,400-foot" sand), and an upper clay unit (Criner and Armstrong, 1958, p. 3).

The lower unit of the Wilcox Group consists of gray to greenish-gray lignitic clay which grades upward into silt and fine-grained sand deposits. The percentage of sand increases upward in this unit, perhaps representing a transitional phase between the marine Porters

TABLE 1.—*Geologic units underlying the Memphis area*

System	Series	Group	Stratigraphic unit	Thickness (feet)	Description and relation to water
Quaternary	Recent		Alluvium	0–200	Alluvial sand, clay, and gravel. For domestic wells. Could be important source of water for some industrial use.
	Pleistocene		Loess	0–100	Wind-deposited silt. (Topographically higher than alluvium.) Low permeability. Not a source of ground water.
	Pleistocene and (or) Pliocene?		Terrace deposits	0–140	Alluvial sand and gravel. Several domestic wells. Could be major source of water for industrial and irrigation use.
Tertiary	Eocene		Jackson(?) Formation (lower part may include some Claiborne beds)	0–330	Gray, bluish-gray, greenish-gray, and tan clay; minor amounts of lignite and fine-grained sand. Generally impermeable and considered to be upper confining bed for water in "500-foot" sand.
		Claiborne	"500-foot" sand (upper part may include some Jackson(?) beds)	500–800	Fine- to coarse-grained sand; minor amounts of lignite and tan clay and silt; sands locally at base. Thick clay bed locally at base. Coarse channel deposits in Memphis area is contained. Nicomia area is contained.
		Wilcox	Flour Island Upper clay unit	200–395	Gray, greenish-gray, and brown carbonaceous clay. Thin lignite and fine-grained sand lenses locally. Low permeability confines water in "500-foot" and "1,400-foot" sands.
			Middle sand unit ("1,400-foot" sand)	150–800	Fine- to medium-grained sand; minor amounts of lignite and clay lenses. Second principal aquifer which supplies about 10 percent of water used in Memphis area.
			Lower clay unit	190–250	Gray, greenish-gray, and brown carbonaceous clay, and lignite; sandy near top. Impermeable lower confining bed for water in "1,400-foot" sand.

1 See p. 039.

Porters Creek Clay and the predominately sandy middle unit of the Wilcox. The clay unit ranges in thickness from 190 feet in test well Fa: W–1 about 30 miles northeast of Memphis near Braden, Fayette County, to 250 feet in well Sh: U–12, 3.5 miles south of Millington, Shelby County (pl. 1).

1400' Sand The middle sand unit referred to as the "1,400-foot" sand by Criner and Armstrong (1958, p. 3), consists mostly of unconsolidated well-sorted fine- to medium-grained sand. Logs of a few wells in the Memphis area show thin interbedded lenses of clay, but these beds probably are not areally extensive. The sand ranges in thickness from 150 feet in test well Fa: W–1 near Braden, Fayette County, to 240 feet in well Sh: U–12, 3.5 miles south of Millington, Shelby County (pl. 1). The thickness increases westward to 300 feet in an oil-test well 7 miles west of West Memphis, Ark.

Flour Island → The upper unit of the Wilcox Group in the Memphis area consists of dark-gray or brown lignitic clay containing local lenses of silty and sandy clay from 1 to 50 feet thick. Thin beds of fine-grained sand cemented with iron oxide form "rock" layers a few inches thick in many parts of the unit. The upper clay of the Wilcox grades upward to a sandy clay; however, the contact with the overlying sand of the Claiborne Group is distinct, as is indicated by geophysical logs (pl. 1) of wells in the area. The thickness of the upper clay section varies greatly, ranging from 200 to 395 feet in the Sheahan well field in the south-central part of Shelby County.

CLAIBORNE GROUP

The Claiborne Group in the Memphis area is represented by the "500-foot" sand, which has been divided into lower and upper parts by Criner and Armstrong (1958, p. 7–8). This subdivision was based on the different lithologies of the two parts and on their separation in much of the area by clay beds as much as 150 feet thick. Electrical logs and drillers' logs of wells show that the lower part of the Claiborne varies greatly in thickness and contains a greater number of clay beds that are thicker and more extensive than those in the upper part. Even the thickest of the clay beds, however, are not continuous, so that no particular bed can be considered as a hydrologic boundary between distinctive lower and upper parts. In this report, therefore, the "500-foot" sand is considered as a single hydrologic unit. Generally the Claiborne Group is characterized by a greater proportion of clay in the lower part and by a gradation in sand particle size from fine to medium grained in the lower part to medium to coarse grained in the upper part. The thickest and most extensive clay bed underlies the central part of the Memphis area and is in the lower part of the Claiborne Group.

The thickness of the Claiborne Group ranges from 500 feet in test well Fa: W-1 near Braden, Fayette County, to 800 feet in well Sh: J-101 in the southern part of the city of Memphis (pl. 1). The top of the "500-foot" sand was indicated in geophysical logs of wells as the level at which the sediments change from predominantly sand to predominantly clay or silt. The contacts were picked to define a hydrologic unit ("500-foot" sand regardless of geologic age. For this reason the upper part of the unit as shown on plate 1 may include some sandy beds belonging to the overlying Jackson(?) Formation.

JACKSON(?) FORMATION

The Jackson(?) Formation overlies and confines the "500-foot" sand. Locally the two units interfinger with one another, and the contact between them represents a hydrologic boundary rather than a precise stratigraphic horizon (pl. 1).

The Jackson(?) Formation is composed of dark-gray to greenish-gray, dark-blue, or dark-brown clay. It is generally carbonaceous and contains very fine quartz sand along bedding planes. The formation is absent in southeastern Shelby County but is as much as 330 feet thick in the Parkway well field.

Fisk (1944, fig. 67, p. 62) distinguished a lower marine and an upper nonmarine facies in the Jackson(?) Formation. The marine facies closely follows the present course of the Mississippi River and extends northward at least 25 miles to Lauderdale County; there an exposure contains glauconite, foraminifera, shark teeth, and bones of sea animals. Fossil plants and leaves are abundant, and seams of lignite as much as 10 feet thick are common in the nonmarine facies.

TERRACE DEPOSITS AND ALLUVIUM

The terrace deposits ranges from a few feet to about 160 feet in thickness and are composed mostly of coarse-grained quartz sand and fine-grained iron-stained quartz and chert gravel. Thin lenses of silty ocher-colored clay are common in the lower part. The bottom 3 inches to 4 feet of sand and gravel generally is cemented with limonite. Although the contact with the Jackson(?) Formation represents an erosional surface, thin lenses of reworked Jackson(?) clay and sand form a transitional zone at the base of the terrace deposits in many places; geophysical logs show a gradation from one unit to the other.

The terrace deposits occur as an irregular belt parallel to the Mississippi River and also occur along the larger streams in the area. The deposits thin gradually eastward and are absent in many places as a result of erosion or nondeposition.

Two terraces were recognized by Glenn (1906, p. 41–44), who designated the higher as Pliocene and the lower as Pleistocene. Fisk (1944, p. 63) considered them both to be of Pleistocene age. Because geophysical logs show no consistent correlation points, by means of which the terrace deposits can be divided in the subsurface, they are considered as a single unit in this report.

The alluvium ranges from 0 to 200 feet in thickness and is composed of sand, clay, silt, and gravel. It is confined to narrow strips along the principal streams and in most places is subject to flooding and reworking. The coarsest material is generally near the present stream channels, and the finest is near the featheredges of the deposits.

The alluvium is lithologically similar to the underlying terrace deposits, and the contact cannot be determined from geophysical logs. However, samples of the alluvium locally contain carbonaceous material and decaying vegetation which aid in distinguishing between the two units.

GEOLOGIC STRUCTURE

The Memphis area is near the axis of the Mississippi embayment syncline, which plunges southward at a rate of about 10 feet per mile in the vicinity of Memphis. The syncline began to form in Late Cretaceous time (Fisk, 1944, p. 8, 64; and Caplan, 1954, p. 5) as a result of regional subsidence centered along the present coast of the Gulf of Mexico. The axis of the structural trough approximately follows the present course of the Mississippi River.

As the region subsided, faulting of the unconsolidated sediments and the underlying Paleozoic rocks occurred, forming a rectangular pattern of faults and fractures trending northeast and northwest (Fisk, 1944, p. 64, 66). One of the major faults in this system, the Big Creek fault (Fisk, 1944, p. 66), trends northeast from near West Helena, Ark., along the western edge of the Memphis area to Reelfoot Lake near the Tennessee-Kentucky border; at Reelfoot Lake it appears to be related to the New Madrid (Missouri) fault system. This fault is of particular significance because it apparently restricts the movement of ground water from the west into the Memphis area.

A major fault is suggested by an abrupt bend in the Mississippi River near the mouth of Nonconnah Creek and by electrical logs of wells that indicate as much as 50 feet of displacement of geologic units in the Hickory Hill well field in the south-central part of the area. If such a fault exists, it has so far had little effect on the movement of water in the "500-foot" sand.

HYDROLOGY OF THE AQUIFER SYSTEMS

GEOLOGIC CONTROL OF GROUND WATER IN THE MEMPHIS AREA

The size, shape, and degree of interconnection of the open spaces between rock particles control the amount of water that can be ac-

REFERENCE 9

SOIL SURVEY

Shelby County Tennessee

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
TENNESSEE AGRICULTURAL EXPERIMENT STATION
Issued November 1970

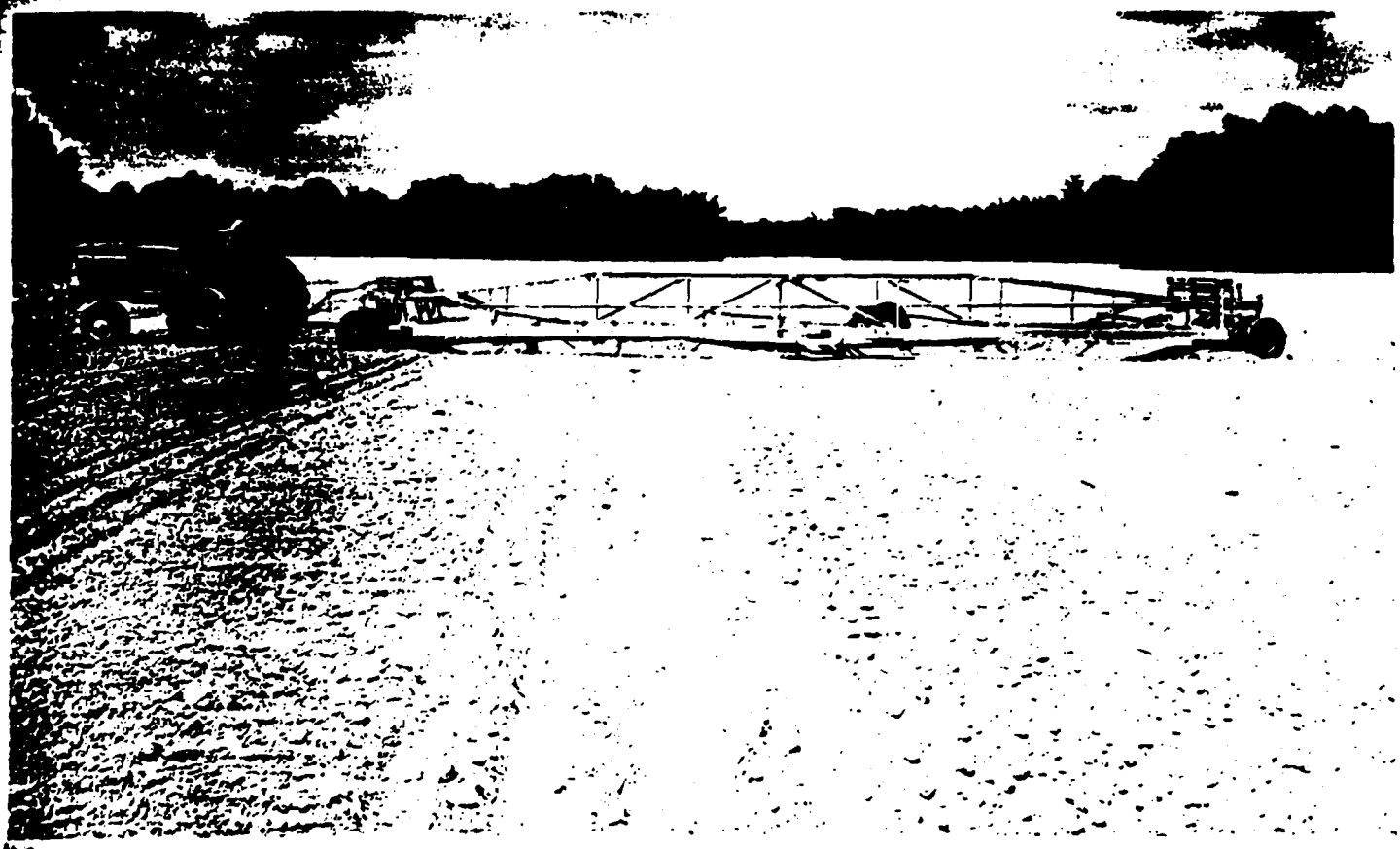


Figure 7.—Shaping an area of Falaya silt loam, to eliminate spots where water collects. The equipment is a land plane.

vested furnish a considerable amount of food for game. The seeds of weeds, annual lespedeza, and native plants that grow along field borders and ditches provide additional food. Scattered areas of trees and bushes along ditchbanks and field borders provide some cover. Low areas that are 3 acres or more in size can be developed as feeding places for waterfowl by establishing food-producing plants and then flooding. The water must be removed in spring so the crops can be planted in summer. (Capability unit IIw–1)

Filled land, silty (Fs).—This land type consists of soil material that has been moved for the purpose of leveling and building up sites for industrial, commercial, or residential development. The areas are 5 to 40 acres in size. Most are near or on the outer edges of Memphis. Included in mapping were some gravel pits that have been filled in and are suitable for farming.

A few areas have been filled with trash, tree trunks and roots, overlapping slabs of concrete, and other types of filling material that could cause settling of buildings and could also cause difficulty in sinking pilings. Areas that are adjacent to Graded land, silty materials, generally consist of clean, silty fill.

If a good seedbed is prepared and if enough fertilizer and water are used, this land type is well suited to lawn grasses and ornamental plants. Some areas are suitable for development as recreational sites, such as tennis courts, golf courses, and parks. (Not in a capability unit)

Filled land, sandy (Fy).—This land type consists of sand that was dredged from the Mississippi River. Most areas were made for industrial sites. The largest single tract is the industrial site on Presidents Island, which has been built up to an elevation of 10 feet above the highest locally recorded flood.

This land type is low in natural fertility. The available water capacity is very low. Frequent applications of fertilizer and water are needed to establish and maintain lawns and shrubbery around buildings. (Not in a capability unit)

Grenada Series

This series consists of moderately well drained, silty soils that have a fragipan. These soils formed in loess more than 4 feet thick. The slope range is 0 to 12 percent.

Representative profile of Grenada silt loam, 2 to 5 percent slopes, eroded, 200 yards west of Bobo Road and 400 yards south of Smith Road:

Ap—0 to 6 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; strongly acid; abrupt, smooth boundary.

B21—6 to 13 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, subangular blocky structure; friable; strongly acid; clear, smooth boundary.

B22—13 to 22 inches, yellowish-brown (10YR 5/4) silt loam; few, medium, pale-brown and brown mottles; weak, medium, subangular blocky structure; friable; few,

Figure 9.—Severely eroded, strongly sloping Grenada soil. Light-colored areas show where the fragipan is exposed or is close to the surface.

Most of this soil is idle and is either bare of vegetation or has a scrubby growth of weeds, broomsedge, briers, and bushes. It is poorly suited to row crops because of the slope and the erosion hazard. Only a small acreage is cultivated. Grasses and legumes that have shallow root systems or roots that can penetrate the fragipan can be grown. These include tall fescue, sericea lespedeza, and annual lespedeza.

The slope and the compact subsoil make management difficult. Well-fertilized hay and pasture help to control runoff and erosion.

The site is fair for pine trees, but productivity varies greatly from place to place because of differences in erosion and thickness of root zone. Seedling mortality ranges from slight to severe. The hazard of erosion is severe.

Most of this soil has only a sparse cover that provides little food or cover for wildlife. Tall fescue, sericea lespedeza, and annual lespedeza are fairly well suited, and they furnish some food for wildlife. (Capability unit VIe–2)

Graded land, silty materials (Gr).—This land type consists of areas that have been graded in preparation for subdivisions (fig. 10) and for commercial and industrial building. The depth to which these areas have been graded varies from a few inches to 5 feet or more and is most commonly about 3 feet. The slope, after grading, is generally between 1 and 5 percent.

Grenada, Loring, and Memphis soils were predominant in these areas before grading. In most areas the original soil profiles have been disturbed to such an extent that they no longer can be identified. The soil material is brown, yellowish brown, and dark brown in color and silty in texture.

The areas of this land type range in size from a few acres to about 400 acres. They are on the outer edges of the city of Memphis and in the county just outside the city. Included in some of the areas mapped were small areas of Filled land, silty.

Lawn grasses and ornamental plants and trees grow well if a good seedbed is prepared and enough fertilizer and water are applied. (Not in a capability unit)

Gullied land, silty (Gs).—This land type occurs as tracts 5 to 20 acres in size. It is mostly on hillsides where the slope ranges from 8 to 20 percent. Gullies make up 25 percent or more of each area. The gullies range from 3 to 15 feet in depth and from 5 to 80 feet in width. Except in small patches and narrow strips, the soil profiles have been destroyed. Between the gullies, sheet erosion has removed much of the original surface layer and subsoil. In some gullies sandy and gravelly Coastal Plain material is exposed.

mudagrass, and alfalfa, are suitable. These crops are difficult to establish, but they respond to heavy applications of lime and fertilizer. Grazing is possible during winter because the surface does not get wet and soft. Some areas are in poor native pasture.

This soil erodes easily if not protected. Control of runoff is the main management problem. Well-fertilized pastures of grasses and legumes, if not overgrazed or mowed too closely, help to reduce runoff and limit erosion.

Little or none of this soil is woodland. Most of it is idle and has a scrubby growth of broomsedge, briers, and bushes and a sparse stand of cedars. The site is good for red oak, white oak, yellow-poplar, black walnut, and other upland hardwoods and for loblolly pine. Plant competition is moderate. Abandoned fields where trees are to be planted may need site preparation, cultivation, and weeding. Because of the severe hazard of erosion, protection must be provided if roads and trails are built.

This soil is suited to many perennial plants that provide food and cover for wildlife. Sericea lespedeza, tall fescue, and bermudagrass protect the soil and furnish some food. Autumn olive, pyracantha, and shrub lespedeza are among the perennials that can be planted in idle areas and along field borders. Many native plants, such as sumac, wild plum, wild lespedeza, briers, and bushes, provide some food and cover. (Capability unit VIe-1)

Memphis Series

This series consists of deep, well-drained, strongly acid, silty soils on uplands. These soils formed in loess that ranges in thickness from about 100 feet in the western part of the county to about 4 feet on the hilly slopes in the eastern part of the county.

Representative profile of Memphis silt loam, 2 to 5 percent slopes, 3 miles north of Eads, 20 yards west of Collierville-Arlington Road:

Ap—0 to 7 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; strongly acid; abrupt, smooth boundary.

B21t—7 to 18 inches, brown (7.5YR 4/4) to reddish-brown (5YR 4/4) silty clay loam; moderate, fine and medium, subangular blocky structure; friable; thin continuous clay films; strongly acid; gradual, smooth boundary.

B22t—18 to 30 inches, brown (7.5YR 4/4) to reddish-brown (5YR 4/4) silt loam; moderate, medium, subangular blocky structure; friable; thin continuous clay films; strongly acid; gradual, smooth boundary.

B23t—30 to 74 inches, brown (7.5YR 4/4) silt loam; weak, coarse, subangular blocky structure; friable; few pale-brown silt coatings in old root channels and cracks; thin patchy clay films; few, small, black concretions; strongly acid; clear, smooth boundary.

C—74 to 108 inches; dark-brown (7.5YR 3/2) silt loam; massive; firm; pale-brown silt coatings in cracks; strongly acid.

The color of the Ap horizon ranges from dark grayish brown to brown. The texture of the B21 horizon ranges from heavy silt loam to silty clay loam. The color of the B horizon ranges from brown to reddish brown.

Memphis silt loam, 2 to 5 percent slopes (MeB).—This is a deep, well-drained soil on broad tops of low-lying hills. The plow layer is brown, very friable silt loam 7 inches thick. The uppermost 10 to 20 inches of the subsoil is brown to reddish-brown, friable silty clay loam. Below this is brown to reddish-brown, friable silt loam several feet thick.

In some places the texture of all layers is silt loam, but in most places the layer immediately below the surface layer is slightly more clayey than the one above or below it. The more clayey layer is approximately 12 inches thick. Included in mapping were a few small wooded areas that have a surface layer as much as 12 inches thick.

This soil is strongly acid or medium acid in reaction and moderately high in content of phosphorus and potassium. The response to fertilization and other good management practices is good. The root zone is very deep. The available water capacity is high.

This is one of the most productive upland soils in the State and one of the most extensive soils in the county. Except for about 35 percent of the acreage, which is in urban development, the soil is used mainly for cotton, soybeans, and corn. If adequately fertilized and otherwise well managed, it is also suited to lespedeza, alfalfa, white clover, tall fescue, orchardgrass, and all other crops commonly grown in this region.

Runoff is the main limitation. Control of erosion is the main management problem. Even though the slope is gentle, some washing occurs if this soil is cultivated. Clean-tilled row crops should not be grown every year. A suitable cropping system, adequate fertilization, and control of runoff will conserve the soil. An example of a suitable cropping system is a row crop every other year, or 2 years of a row crop followed by 2 years of hay or pasture. The slopes are well suited to contouring, terracing, and stripcropping. Grass should be established in the natural watercourses. Heavy applications of fertilizer can be used.

The suitable crops provide a good vegetative cover and a large amount of crop residue. The vegetative cover helps to control runoff and to conserve moisture. The crop residue helps to maintain the organic-matter content and to keep the soil in good tilth.

The wooded areas occur as small tracts. The site is good for white oak, red oak, yellow-poplar, and other upland hardwoods and for loblolly pine. Loblolly pine is not native, but trial plantings up to 20 years of age show that it is well suited. Mainly because of a lack of suitable seed trees, natural regeneration cannot always be relied upon to provide adequate stocking of high-value trees. Plant competition is moderate. In natural stands it may be necessary to plant seedlings and remove cull trees, low-value trees, and bushes.

This soil is well suited to many plants that furnish food and cover for bobwhite quail, doves, and rabbits. Wastes left when such crops as soybeans, corn, and small grain are harvested and the seeds of weeds, lespedeza, and native plants that grow along field borders furnish food. The small wooded areas and the brush in the odd-shaped areas in the corners of fields and along old fence rows provides some cover. Annuals and perennials can be planted in field borders and along fence rows. Fields managed specifically for doves can be planted to browntop millet, which matures quickly and so can be planted after a small-grain crop has been harvested.

About a third of the acreage is in urban areas. Because it is deep, well drained, and friable, this soil is well

SOIL LEGEND

The first capital letter is the initial one of the soil name. The second capital letter, A, B, C, D, E, F, or G, represents the slope; ranging from nearly level (A) to very steep (G). Most symbols without a slope letter are those of nearly level soils or land types; a few designate land types that have a considerable range of slope. A final number, 2 or 3, in the symbol shows that the soil is eroded or severely eroded.

SYMBOL	NAME
Ad	Adler silt loam
Bo	Bonn silt loam
Bw	Bowdre silty clay
Ca	Calloway silt loam
Co	Collins silt loam
Cr	Commerce silt loam
Cs	Convent silt loam
Cu	Crevasse fine sand
Cv	Crevasse silt loam
Fm	Falaya silt loam
Fs	Filled land, silty
Fy	Filled land, sandy
GaA	Grenada silt loam, 0 to 2 percent slopes
GaB	Grenada silt loam, 2 to 5 percent slopes
GaB2	Grenada silt loam, 2 to 5 percent slopes, eroded
GaC	Grenada silt loam, 5 to 8 percent slopes
GaC3	Grenada silt loam, 5 to 8 percent slopes, severely eroded
GaD	Grenada silt loam, 8 to 12 percent slopes
GaD2	Grenada silt loam, 8 to 12 percent slopes, eroded
GgD3	Grenada complex, 5 to 12 percent slopes, severely eroded
Gr	Grinded land, silty materials
Gs	Gullied land, silty
He	Heavy silt loam
Ib	Iberia silt loam
Lb	Levees and Borrow Pits
LoB	Loring silt loam, 2 to 5 percent slopes
LoB2	Loring silt loam, 2 to 5 percent slopes, eroded
LoC2	Loring silt loam, 5 to 8 percent slopes, eroded
LoD	Loring silt loam, 8 to 12 percent slopes
LoD2	Loring silt loam, 8 to 12 percent slopes, eroded
LoD3	Loring silt loam, 5 to 12 percent slopes, severely eroded
MeB	Memphis silt loam, 2 to 5 percent slopes
MeB2	Memphis silt loam, 2 to 5 percent slopes, eroded
MeC2	Memphis silt loam, 5 to 8 percent slopes, eroded
MeD2	Memphis silt loam, 8 to 12 percent slopes, eroded
MeD3	Memphis silt loam, 5 to 12 percent slopes, severely eroded
MeE	Memphis silt loam, 12 to 20 percent slopes
MeF3	Memphis silt loam, 12 to 30 percent slopes, severely eroded
MeG	Memphis silt loam, 30 to 65 percent slopes
Rb	Robinsonville fine sandy loam
Rn	Robinsonville silt loam
Sh	Sharkey clay
Sw	Swamp
Tu	Tunica silty clay
Wv	Waverly silt loam

WOR

Highways and roa

Dual .....

Good motor ..

Poor motor ...

Trail .....

Highway markers

National inters

U. S. .....

State or count

Railroads

Single track .

Multiple track

Abandoned ..

Bridges and cros

Road .....

Trail .....

Railroad .....

Ferry .....

Ford .....

Grade .....

R. R. over ..

R. R. under

Tunnel .....

Buildings .....

School .....

Church .....

Mine and quarry

Gravel pit .....

Power line .....

Pipeline .....

Cemetery .....

Dams .....

Levee .....

Tanks .....

Well, oil or gas

Forest fire or lo

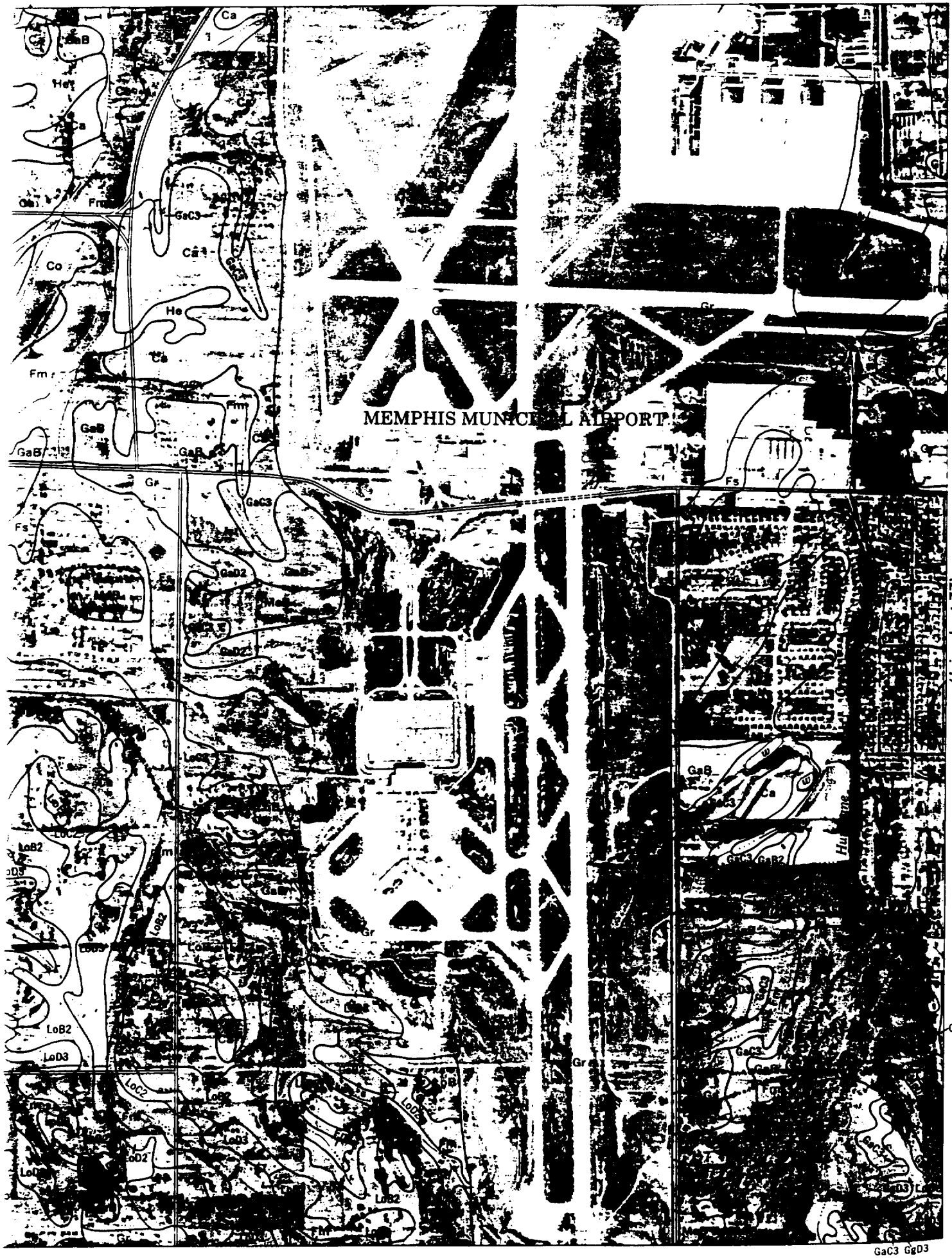
Cotton gin ....

GUIDE TO MAPPING UNITS

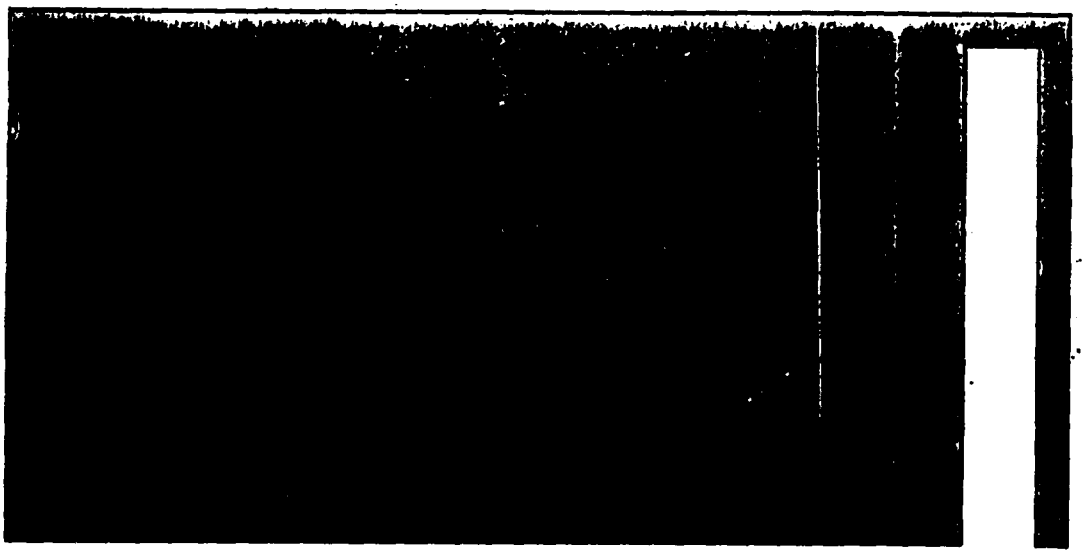
For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. The capability units are not discussed separately. For a discussion of the suitability of a given soil for crops and pasture, for woodland, for wildlife, and for lawn grasses and shrubs, see the discussion of the mapping unit. Other information is given in tables as follows:

Acreage and extent, table 2, page 11.
Estimated yields, table 3, page 38.
Engineering uses of the soils, table 4, page 42; table 5, page 44.
Nonfarm uses of the soils, table 6, page 48.

Map symbol	Mapping unit	Described on page	Capability unit Symbol
Ad	Adler silt loam	10	I-2
Bo	Bonn silt loam	12	IVw-1
Bw	Bowdre silty clay	12	IIw-1
Ca	Calloway silt loam	13	IIIw-2
Cc	Collins silt loam	14	I-2
Cr	Commerce silt loam	14	I-2
Cs	Convent silt loam	15	IIw-1
Cu	Crevasse fine sand	15	IVs-1
Cv	Crevasse silt loam	16	IVs-1
Fm	Falaya silt loam	16	IIw-1
Fs	Filled land, silty	17	None
Fy	Filled land, sandy	17	None
GaA	Grenada silt loam, 0 to 2 percent slopes	18	IIw-2
GaB	Grenada silt loam, 2 to 5 percent slopes	19	IIe-2
GaB2	Grenada silt loam, 2 to 5 percent slopes, eroded	19	IIIe-2
GaC	Grenada silt loam, 5 to 8 percent slopes	20	IIIe-2
GaC3	Grenada silt loam, 5 to 8 percent slopes, severely eroded	20	IVe-2
GaD	Grenada silt loam, 8 to 12 percent slopes	21	IVe-2
GaD2	Grenada silt loam, 8 to 12 percent slopes, eroded	21	VIe-2
GgD3	Grenada complex, 5 to 12 percent slopes, severely eroded	21	VIe-2
Gr	Graded land, silty materials	22	None
Gs	Gullied land, silty	22	VIIe-2
He	Henry silt loam	23	IIIw-1
Ib	Iberia silt loam	25	IIIw-3
Lb	Levees and Borrow Pits	25	VIe-3
LoB	Loring silt loam, 2 to 5 percent slopes	26	IIe-1
LoB2	Loring silt loam, 2 to 5 percent slopes, eroded	27	IIIe-1
LoC2	Loring silt loam, 5 to 8 percent slopes, eroded	27	IIIe-1
LoD	Loring silt loam, 8 to 12 percent slopes	28	IVe-1
LoD2	Loring silt loam, 8 to 12 percent slopes, eroded	28	IVe-1
LoD3	Loring silt loam, 5 to 12 percent slopes, severely eroded	28	VIe-1
MeB	Memphis silt loam, 2 to 5 percent slopes	29	IIe-1
MeB2	Memphis silt loam, 2 to 5 percent slopes, eroded	30	IIIe-1
MeC2	Memphis silt loam, 5 to 8 percent slopes, eroded	30	IIIe-1
MeD2	Memphis silt loam, 8 to 12 percent slopes, eroded	31	IVe-1
MeD3	Memphis silt loam, 5 to 12 percent slopes, severely eroded	31	IVe-1
MeE	Memphis silt loam, 12 to 20 percent slopes	31	VIe-1
MeF3	Memphis silt loam, 12 to 30 percent slopes, severely eroded	32	VIe-1
MeG	Memphis silt loam, 30 to 65 percent slopes	32	VIIe-1
Rb	Robinsonville fine sandy loam	33	I-1
Rn	Robinsonville silt loam	33	I-1
Sh	Sharkey clay	33	IIIw-3
Sw	Swamp	34	VIIw-1
Tu	Tunica silty clay	34	IIIw-3
Wv	Waverly silt loam	35	IIIw-1


MEMPHIS MUNICIPAL AIRPORT
GaB
GaC3
LoB2
LoD3
LoC2
LoD2
Gr
Fs
Fm
Co
He
Ca
(Joins sheet 77)
(Joins sheet 76)
GaC3 GgD3

9++
10



R. Allan Freeze

Department of Geological Sciences
University of British Columbia
Vancouver, British Columbia

John A. Cherry

Department of Earth Sciences
University of Waterloo
Waterloo, Ontario

GROUNDWATER

Prentice-Hall, Inc.
Englewood Cliffs, New Jersey 07632

Table 2.2 Range of Values of Hydraulic Conductivity and Permeability

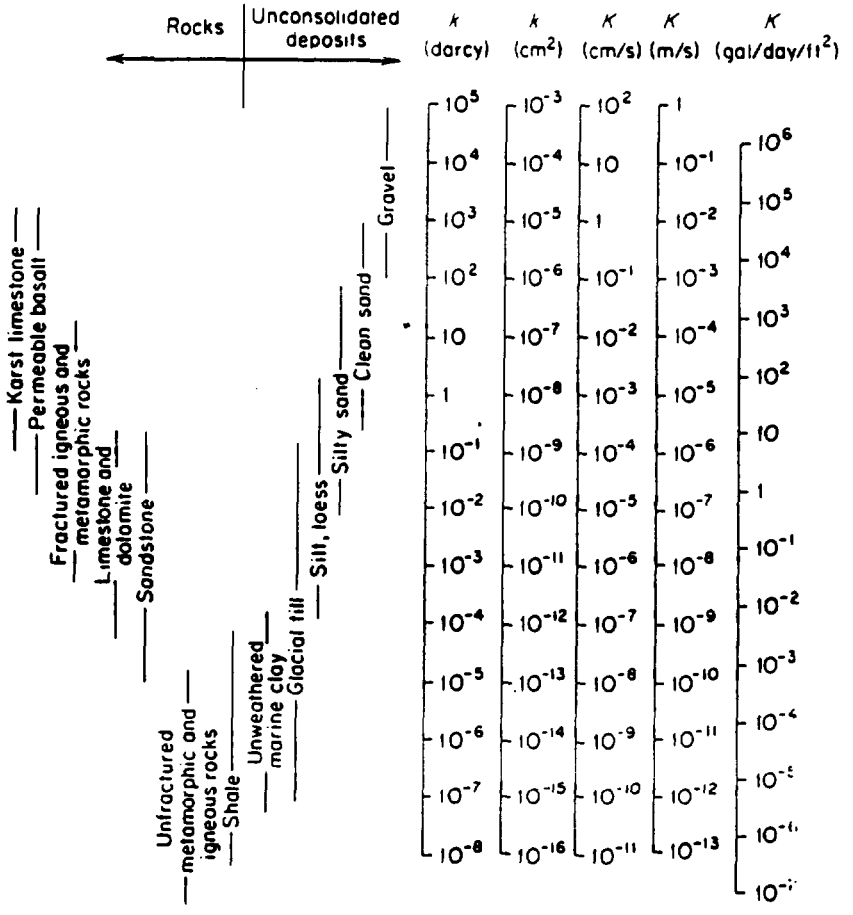


Table 2.3 Conversion Factors for Permeability and Hydraulic Conductivity Units

	Permeability, k*			Hydraulic conductivity, K		
	cm^2	ft^2	darcy	m/s	ft/s	U.S. gal/day/ft^2
cm^2	1	1.08×10^{-3}	1.01×10^{8}	9.80×10^{2}	3.22×10^{3}	1.85×10^{9}
ft^2	9.29×10^{2}	1	9.42×10^{10}	9.11×10^{5}	2.99×10^{6}	1.71×10^{12}
darcy	9.87×10^{-9}	1.06×10^{-11}	1	9.66×10^{-6}	3.17×10^{-5}	1.82×10^{1}
m/s	1.02×10^{-3}	1.10×10^{-6}	1.04×10^{5}	1	3.28	2.12×10^{6}
ft/s	3.11×10^{-4}	3.35×10^{-7}	3.15×10^{4}	3.05×10^{-1}	1	6.46×10^{5}
U.S. gal/day/ft^2	5.42×10^{-10}	5.83×10^{-13}	5.49×10^{-2}	4.72×10^{-7}	1.55×10^{-6}	1

*To obtain k in ft^2, multiply k in cm^2 by 1.08×10^{-3}.

B&V WASTE SCIENCE AND TECHNOLOGY CORP.

TELEPHONE MEMORANDUM

BVWST Project 52012.001
March 3, 1992
11:00 a.m.

Subject: Site-Specific geology & confining layer information

To: Dr. William S. Parks
Company: USGS Water Investigations
Phone No.: (901) 766-2977

Recorded by: Carter Helm

Since there exists no mention of hydraulic conductivity values for aquitards in the Memphis area in Dr. Parks' publication Hydrogeology and Preliminary Assessment of the Potential for Contamination of the Memphis /Aquifer in the Memphis Area, TN, I asked Dr. Parks if the range 1.0×10^{-7} to 1.0×10^{-5} cm/sec is acceptable for the Jackson-Upper Claiborne clay confining unit. He said it is highly variable but the estimation I extracted from Freeze and Cherry appears to somewhat accurately describe the aquitard.

B&V WASTE SCIENCE AND TECHNOLOGY CORP.

TELEPHONE MEMORANDUM

EPA
Raines Road Drum Site
Shelby County Private Wells

BVWST Project 52009.012
BVWST File
October 21, 1991
10:40 a.m.

To: Barry Moore
Company: Shelby County Health Dept.
Phone No.: (901) 576-7741

Recorded by: Jancie Hatcher JSH 10-21-91

He told me that there are probably private wells in the area, but specific locations can't be pinpointed except with a house-to-house survey. The entire area is served by a municipal water system, so everyone has the potential for hook-ups to municipal water.

MEMPHIS LIGHT, GAS AND WATER DIVISION

November 20, 1990

Mr. Robert Morris
Environmental Engineer
United States
Environmental Protection Agency
Region IV
345 Courtland Street N.E.
Atlanta, Georgia 30365

Dear Mr. Morris:

The answers to the questions asked in your letter dated November 15, 1990 to Fred Von Hofe are as follows:

Answer #1

There are 206,652 active connections served by Memphis Light, Gas and Water (see attachment).

Answer #2

The water from all eight pumping stations is never at one time blended together. However, at the boundaries of service areas of individual pumping stations, the water could potentially blend; for instance, water from Davis and Allen could blend. Also, the boundaries of service areas of individual pumping stations may shift slightly depending on the system demand. See attached map of distribution system.

Answer #3

Private wells in the Memphis City limit would be regulated by the Memphis and Shelby County Health Department. I would suggest you contact Mr. Barry Moore, Technical Specialist, Memphis and Shelby County Health Department, 814 Jefferson, Memphis, Tennessee 38105, telephone number (901) 576-7741.

P.O. BOX 430 MEMPHIS, TENNESSEE 38101 TELEPHONE (901) 528-4011

Answer #4

The City of Memphis includes Whitehaven, the Memphis Airport, and Parkway Village. Memphis Light, Gas and Water serves Memphis and all of Shelby County except the municipalities outside the city.

Answer #5

Memphis Light, Gas and Water sells water to Bartlett, Germantown, and Lakeland within the county.

Answer #6

(a) Memphis Light, Gas and Water provides water to Memphis Park Commission for golf course irrigation.

(b) Memphis Light, Gas and Water bottles Memphis water for commercial sale. There are a number of food processing plants in the Memphis area; a few examples would be Smuckers, Ralston Purina, Kelloggs, Cargill, ADM and more.

If we can be of further assistance in your evaluation, please contact me at (901) 320-3901.

Sincerely,

James H. Webb

James Webb
Manager
Water Laboratory

mb

Attachments

cc: Fred Von Hofe

MEMPHIS LIGHT, GAS AND WATER DIVISION

November 5, 1990

Mr. Charlie Stevens
EPA Region IV
345 Courtland Street N.E.
Atlanta, Georgia 30365

Dear Mr. Stevens:

Jordan English of Tennessee Division of Superfund located in Jackson, Tennessee asked MLGW's Mr. Billy Grimm to send you a copy of "MLGW Water Production 1990." Please find enclosed the requested document.

If I can be of further assistance, please contact me at (901)528-4197.

Sincerely,

Fred Von Hofe

Fred Von Hofe
Water Research Engineer

mb

Enclosure

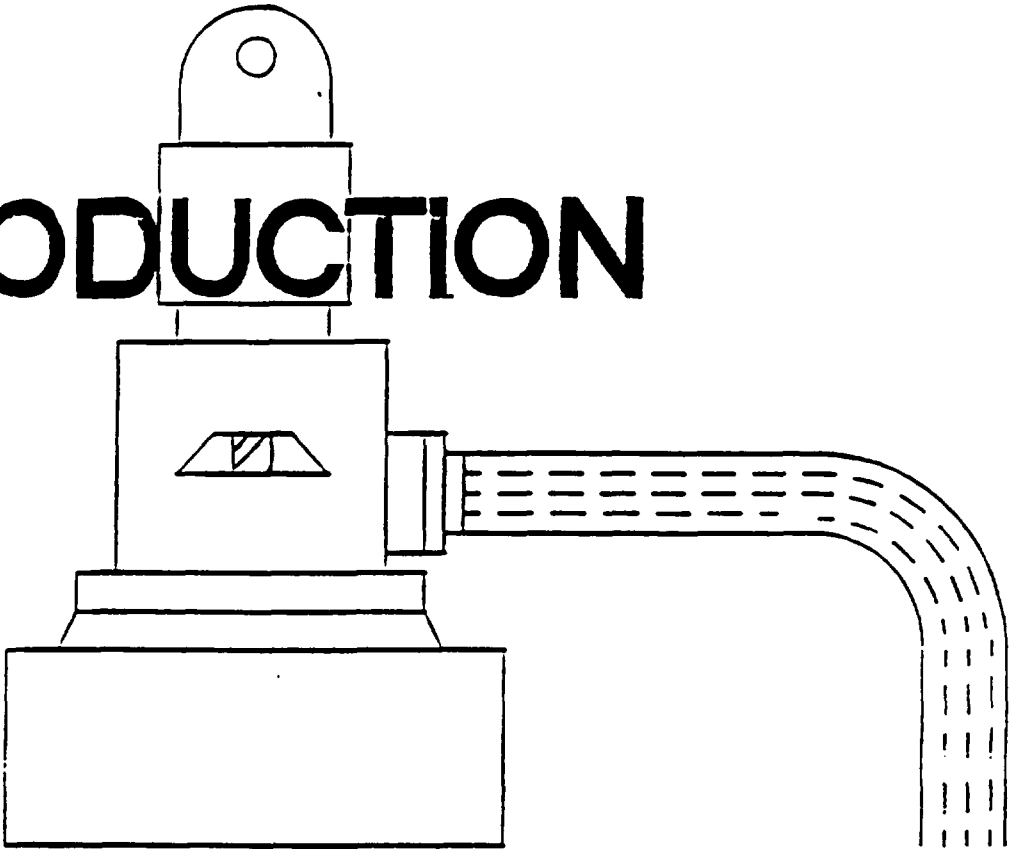
cc: Billy Grimm
R. McDonald
T. Whitlow

P.O. BOX 430 MEMPHIS, TENNESSEE

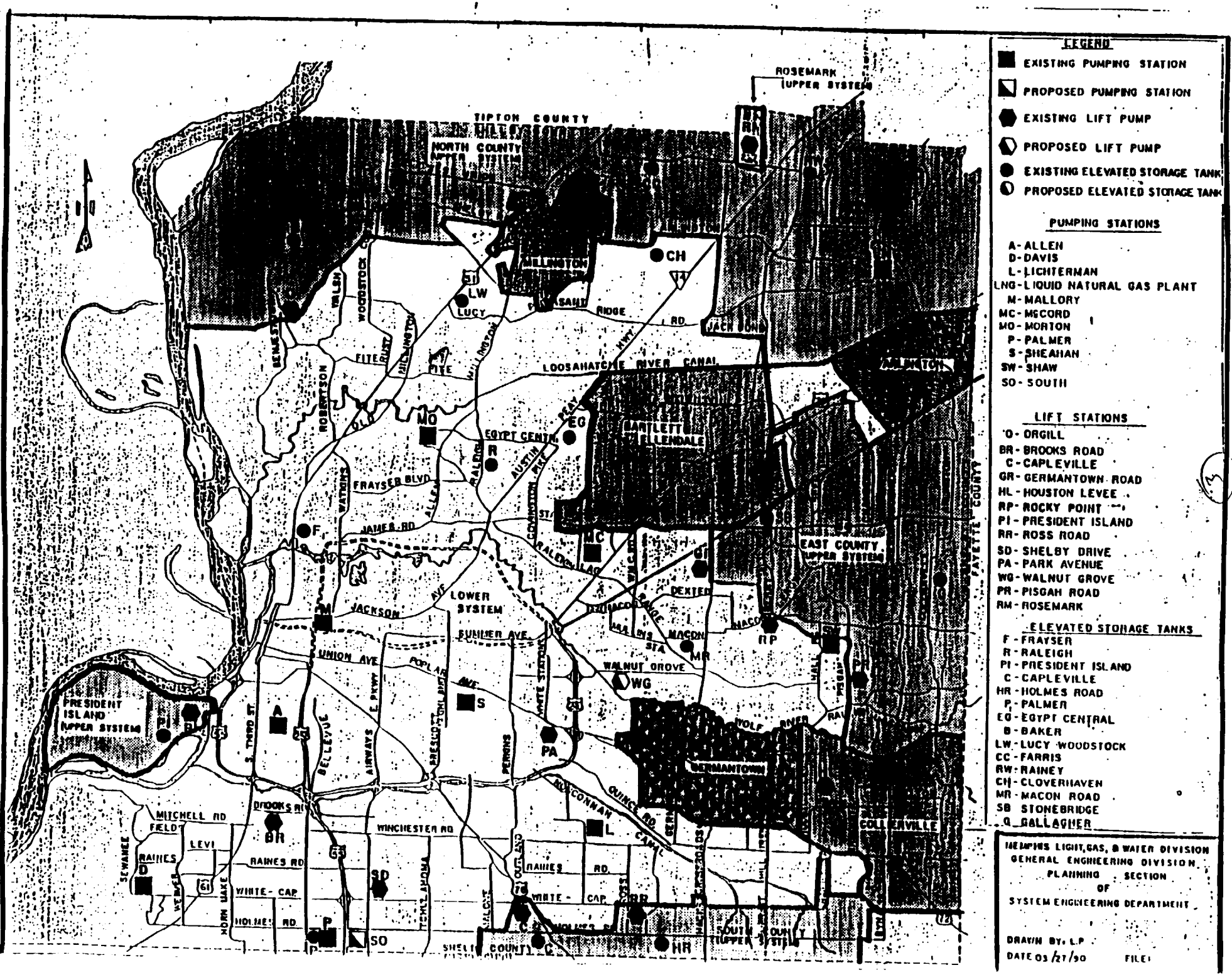
MLGW

WATER

PRODUCTION



1990


ROSEMARK
UPPER SYSTEM
TIPTON COUNTY
NORTH COUNTY
UPPER SYSTEM
ARLINGTON
CH
LW
LUCY
SAULSBURY RIDGE RD
JACK BOND
LOOSAHATCHIE RIVER CANAL
ARLINGTON
MO
EG
EGYPT CENTRAL
BARTLETT
ELLENDALE
FRAYSER BLVD
JAMES RD
F
R
MC
EAST COUNTY
UPPER SYSTEM
GR
DEXTER
LOWER
SYSTEM
JACKSON AVE
SUNNYSIDE AVE
UNION AVE
POPLAR AVE
MACON
MR
RP
WALNUT GROVE
WG
S
PRESIDENT
ISLAND
UPPER SYSTEM
PI
A
PA
WOLF RIVER
GERMANTOWN
COLLIERVILLE
MITCHELL RD
WINCHESTER RD
BR
L
RAINES RD
WHITE - CAP
D
SD
HOLMES RD
P
SO
SHELBY COUNTY
C
HR
SOUTH
UPPER
SYSTEM
FAYETTE COUNTY
LEGEND
EXISTING PUMPING STATION
PROPOSED PUMPING STATION
EXISTING LIFT PUMP
PROPOSED LIFT PUMP
EXISTING ELEVATED STORAGE TANK
PROPOSED ELEVATED STORAGE TANK
PUMPING STATIONS
A - ALLEN
D - DAVIS
L - LICHTERMAN
LNG - LIQUID NATURAL GAS PLANT
M - MALLORY
MC - MCCORD
MO - MORTON
P - PALMER
S - SHEAHAN
SW - SHAW
SO - SOUTH
LIFT STATIONS
O - ORGILL
BR - BROOKS ROAD
C - CAPLEVILLE
GR - GERMANTOWN ROAD
HL - HOUSTON LEVEE
RP - ROCKY POINT
PI - PRESIDENT ISLAND
RR - ROSS ROAD
SD - SHELBY DRIVE
PA - PARK AVENUE
WG - WALNUT GROVE
PR - PISGAH ROAD
RM - ROSEMARK
ELEVATED STORAGE TANKS
F - FRAYSER
R - RALEIGH
PI - PRESIDENT ISLAND
C - CAPLEVILLE
HR - HOLMES ROAD
P - PALMER
EG - EGYPT CENTRAL
B - BAKER
LW - LUCY WOODSTOCK
CC - FARRIS
RW - RAINEY
CH - CLOVERHAVEN
MR - MACON ROAD
SB STONEBRIDGE
G GALLAGHER
MEMPHIS LIGHT, GAS, & WATER DIVISION
GENERAL ENGINEERING DIVISION
PLANNING SECTION
OF
SYSTEM ENGINEERING DEPARTMENT
DRAWN BY: L.P.
DATE 03/27/90
FILE:

MEMPHIS LIGHT, GAS AND WATER DIVISION - PRODUCTION WELLS IN SERVICE

MALLORY	SHEFFIAN	ALLEN	McCORD	LICHTERMAN	DAVIS	NORTON	SHAW	LNG	PALMER
1B	52A	101	201	301	401	601	702	521	506
2B	54B	102	202	303	403	602	706	522	507
3A	55B	103A	203A	304	404	603	710		508
4B	57C	106A	204	305	414	613	722	2 WELLS	509
7B	58B	107	205	306	415	616	723		
9B	61B	108	206	307	416	617	724		4 WELLS
10B	63A	109	207	308	417	619	725		
11B	70A	110A	208	310	418	620	751		
12C	71A	111A	209	311	419	621	755		
13B	72A	112	210	312	420	632	761		
14B	74A	113	215	316	421				
15B	76A	114	217	317	422	10 WELLS	10 WELLS		
16B	78A	115	218	318	424				
17A	79A	117	219	319	425				
19B	80A	118	220	320					
20C	87A	122	221	321	14 WELLS				
21B	91	123	222	322					
23B	93	124	232	323					
24B	95	125A	233	324					
34A	96	126	235	325					
35A	97	127	251	328					
37A	98	128	252	330					
39	99	130	255	332					
40		136A	269						
46	23 WELLS	137		23 WELLS					
		138	24 WELLS						
25 WELLS									
		26 WELLS							

TOTAL PRODUCTION WELLS IN SERVICE 131

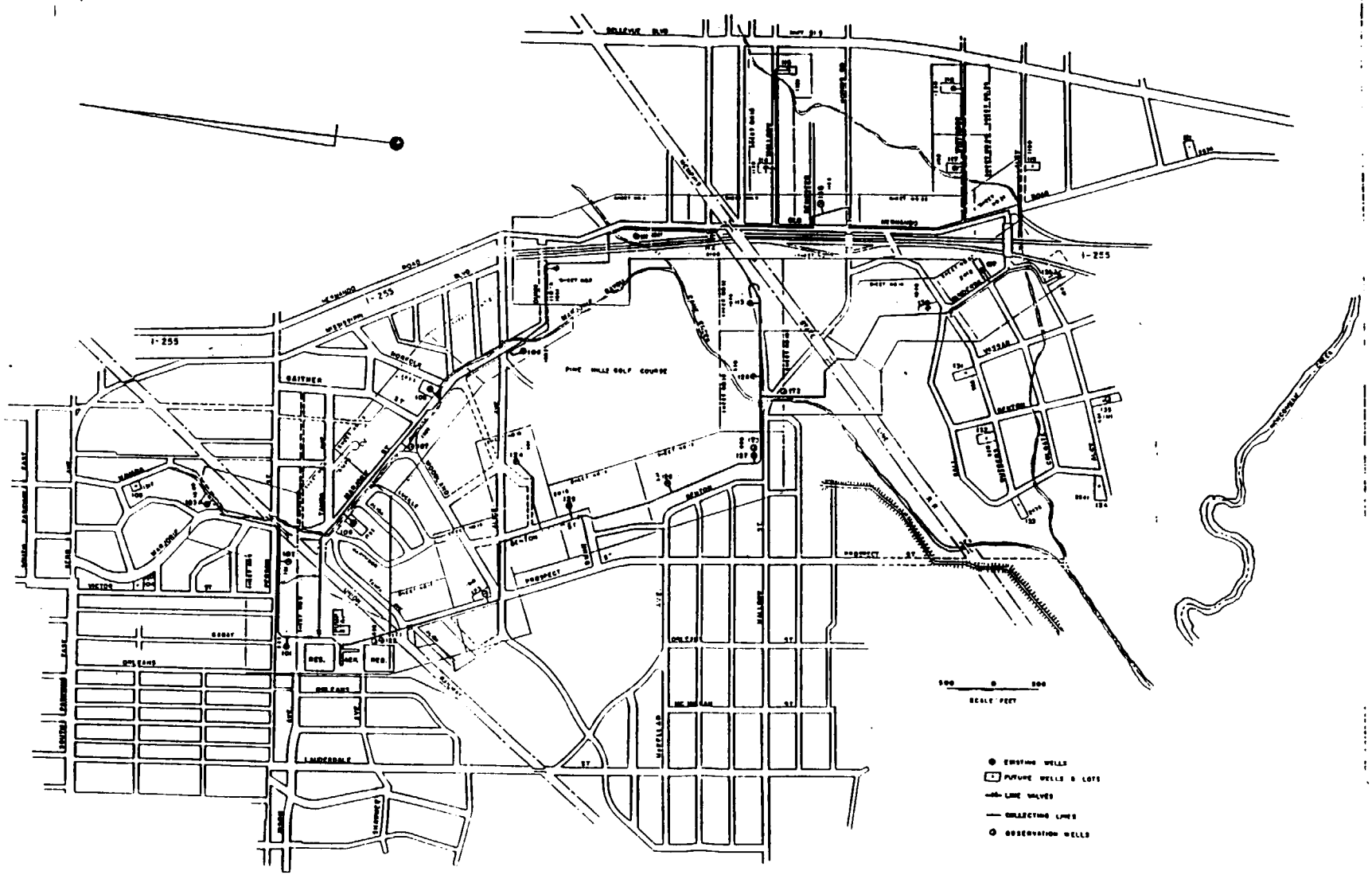
MEMPHIS LIGHT, GAS AND WATER DIVISION
CITY OF MEMPHIS
AVERAGE DAILY PUMPAGE TO SYSTEM
AND
PERSONS PER CITY CONNECTION
For Years Ending December 31

Year	Average Pumpage To System MGD	City Population*	Total No. of Active Connections	Connections % Increase Annually	No. of Active City Connections	Persons Per Cit Connecti
1983	122.33	638,000	197,938	1.11	186,780	3.41
1984	124.84	635,000	201,791	1.95	188,671	3.36
1985	129.20	635,000	202,386	0.29	187,373	3.39
1986	133.40	632,000	203,913	0.75	187,258	3.37
1987	132.50	635,000	204,767	0.42	187,396	3.39
1988	137.20	639,000	205,749	0.48	184,151	3.47
1989	133.40	639,000	206,652	0.43	186,881	3.42

*Acquired from Health Dept. - Statistical Services

ALLEN WELL FIELD

SHEET NO. 1



ALLEN

WELL #	USGS #	ADDRESS	DEPTH	SCREEN	PUMP	MOTOR	RT-Q	RT-HD	ISTUNY	SY	TEF	Q	TDH
101	SH:J-96	685 DISON	548	457	COOK	100	1050	265	11/04/00	22	67	1192	240
102	SH:J-97	781 PERSON	378	292	LAYNE	100	1050	265	4/07/86	25	65	1226	214
103A	SH:J-166	1609 MARJORIE	372	272	COOK	100	1050	265	10/28/05	51	92	1155	220
106A	SH:J-100	1753 MARJORIE	504	406	LAYNE	150	1400	250					
107	SH:J-102	1809 MARJORIE	381	295	LAYNE	100	1050	265	3/24/87	50	50	1057	216
108	SH:J-103	1853 MARJORIE	362	276	LAYNE	100	1050	265	3/31/86	31	70	1161	238
109	SH:J-104	1007 ALICE	395	305	LAYNE	100	1050	265	9/10/86	49	69	1049	239
110A	SH:J-101	1091 ALICE	364	284	LAYNE	100	1000	230	10/28/00	52	69	1239	214
110B (uc)		1091 ALICE											
111A	SH:J-160	2027 HERNANDO	391	286	LAYNE	150	1400	295	5/17/89	42	61	1806	150
112	SH:J-107	2109 HERNANDO	330	259	LAYNE	100	1050	265	10/14/00	37	70	1176	235
113	SH:J-108	1074 HALLORY	505	423	COOK	100	1050	265	4/17/86	29	66	1211	237
114	SH:J-109	1198 HALLORY	370	297	COOK	100	1050	265	11/06/00	44	67	1245	232
115	SH:J-110	1301 HALLORY	390	229	LAYNE	100	1050	265	10/31/00	01	67	1178	210
117	SH:J-112	1192 HHITMORE	371	285	LAYNE	100	1050	265	10/09/00	64	06		
118	SH:J-113	1280 HHITMORE	499	413	LAYNE	100	1050	265	10/21/00	51	69	1269	217
122	SH:J-115	709 DISON	379	305	LAYNE	100	1050	265	9/11/72	52	70	1300	228
123	SH:J-116	1910 TAMPA	397	317	COOK	100	1050	265	4/29/80	49		1325	
124	SH:J-117	801 ALICE	574	499	LAYNE	100	1050	265	9/05/72	40	64	1104	227
125A	SH:J-118	2016 BENTON	539	431	LAYNE	150	1400	255	12/13/89	35	70	1515	250
126	SH:J-119	2100 BENTON	397	300	COOK	100	1050	265	10/17/00	37	70	1319	235
127	SH:J-120	888 HALLORY	452	381	LAYNE	100	1050	265	10/24/00	37	66	1129	228
128	SH:J-121	976 HALLORY	432	354	COOK	100	1050	265	11/05/00	56	74	1417	227
130	SH:J-122	1040 RUTGERS	401	315	LAYNE	100	1050	265	10/17/00	37	79	1170	243
136A	SH:J-167	1085 ALCY	453	394	NORTHINGTON	100	1050	265	10/27/05	26	61	1055	242
137	SH:J-154	2412 VANDERBILT	376	290	LAYNE	100	1050	265	10/10/00	45	74	1169	241
138	SH:J-132	1153 DEMPSTER	537	457	LAYNE	100	1050	265	10/22/00	57	81	956	225

TOTAL WELLS 26

LEGEND

DEPTH - Total depth of well (ft.)
SCREEN - Depth to top of screen (ft.)
PUMP - Make of pump
MOTOR - Horsepower of motor
RT-Q - Flow for rated head (gpm)
RT-HD - Rated head (FT.)
ISTUNY - Last test date
SY - Specific yield (gpm/FT/dd)
TEF - Hire to sure efficiency
Q - Flow with valve wide open (gpm)
TDH - Total dynamic head (FT.)
uc - Under Construction

REFERENCE 15

Table 6. Household, Family, and Group Quarters Characteristics: 1990

[For definitions of terms and meanings of symbols, see text]

State / County / Place and [In Selected States] County Subdivision	Persons in households	All households	Family households: Total	Family households: Married-couple family	Family households: Female householder, no husband present	Nonfamily households: Total	Householder living alone: Total	Householder living alone: 65 years and over: Total	Householder living alone: 65 years and over: Female	Persons per household: Household	Persons per family: Family	Persons in group quarters: Total	Institutionalized persons	Other persons in group quarters
The State	4 748 666	1 853 725	1 348 019	1 059 569	232 690	505 706	442 128	178 077	143 188	2.56	3.06	128 129	65 389	62 740
COUNTY														
Anderson County	67 965	27 384	19 844	16 181	2 958	7 538	6 911	3 117	2 547	2.47	2.96	655	578	77
Bedford County	30 021	11 606	8 766	7 087	1 280	2 840	2 536	1 280	1 017	2.59	3.01	380	343	37
Benton County	14 255	5 784	4 333	3 732	463	1 451	1 349	751	603	2.46	2.90	269	228	41
Bledsoe County	8 606	3 261	2 522	2 104	300	739	670	320	240	2.64	3.08	1 091	1 081	10
Blount County	84 463	33 624	25 344	21 284	3 237	8 280	7 400	3 287	2 661	2.51	2.94	1 506	1 044	462
Bradley County	72 043	27 604	21 157	17 518	2 841	6 447	5 714	2 277	1 886	2.61	3.02	1 669	539	1 130
Campbell County	34 783	13 130	10 158	8 028	1 702	2 982	2 789	1 496	1 182	2.65	3.07	296	285	11
Cannon County	10 384	3 980	3 035	2 574	351	945	872	470	373	2.60	3.03	111	111	-
Carroll County	26 860	10 727	8 013	6 612	1 082	2 714	2 531	1 435	1 146	2.50	2.96	654	388	266
Carter County	50 225	20 189	14 979	12 283	2 114	5 210	4 779	2 314	1 830	2.49	2.94	1 280	749	531
Cheatham County	28 840	9 515	7 748	6 679	776	1 767	1 524	587	436	2.82	3.15	300	180	120
Chester County	11 791	4 566	3 503	2 933	446	1 063	943	514	422	2.58	3.01	1 028	187	841
Claiborne County	25 533	9 629	7 579	6 266	1 007	2 050	1 910	935	772	2.65	3.06	604	210	394
Clay County	7 158	2 855	2 144	1 748	301	711	649	318	274	2.51	2.93	80	71	9
Cocke County	28 840	11 191	8 483	6 551	1 500	2 708	2 470	1 138	882	2.58	3.00	301	270	31
Coffee County	39 855	15 500	11 727	9 883	1 556	3 773	3 431	1 586	1 284	2.57	3.01	484	452	32
Crockett County	13 103	5 103	3 856	3 141	587	1 327	1 257	786	623	2.53	3.00	275	275	-
Cumberland County	34 207	13 438	10 451	8 842	1 288	2 973	2 688	1 290	1 026	2.56	2.92	529	529	-
Davidson County	499 680	207 530	131 395	95 392	29 555	76 135	62 630	18 289	14 989	2.36	2.97	21 096	10 317	10 779
Decatur County	10 330	4 216	3 109	2 603	381	1 107	1 032	607	461	2.45	2.91	142	142	-
DeKalb County	14 237	5 686	4 316	3 574	584	1 380	1 283	682	563	2.50	2.93	123	106	17
Dickson County	34 532	13 019	10 099	8 180	1 510	2 920	2 648	1 283	1 007	2.65	3.06	529	389	140
Dyer County	34 343	13 617	9 823	7 888	1 643	3 884	3 380	1 773	1 436	2.52	3.01	511	474	37
Fayette County	25 110	8 453	6 717	5 038	1 334	1 736	1 576	765	556	2.97	3.40	449	436	13
Fentress County	14 550	5 511	4 258	3 415	665	1 253	1 166	585	439	2.64	3.07	110	110	-
Franklin County	33 429	12 660	9 883	8 412	1 135	2 777	2 530	1 312	1 061	2.64	3.04	1 296	314	982
Gibson County	45 568	18 381	13 472	10 708	2 248	4 909	4 573	2 560	2 114	2.48	2.96	747	644	103
Giles County	25 336	9 832	7 454	6 038	1 116	2 378	2 218	1 166	901	2.58	3.02	405	385	20
Grainger County	16 912	6 384	5 078	4 281	581	1 316	1 217	580	450	2.64	3.02	183	146	37
Greene County	54 175	21 482	16 280	13 280	2 295	5 202	4 747	2 120	1 687	2.52	2.94	1 578	727	851
Grundy County	13 157	4 784	3 743	3 048	534	1 041	978	522	412	2.75	3.18	205	193	12
Hamblen County	49 750	19 428	14 795	11 886	2 314	4 624	4 138	1 829	1 313	2.56	2.97	730	525	205
Hamilton County	279 044	111 799	78 964	60 780	15 042	32 835	29 025	11 581	9 488	2.50	3.02	6 492	3 622	2 870
Hancock County	6 571	2 484	1 924	1 505	321	560	532	269	212	2.65	3.07	168	168	-
Hardeman County	22 589	8 278	6 190	4 534	1 356	2 088	1 887	964	751	2.73	3.22	788	770	18
Hardin County	22 350	8 726	6 633	5 480	882	2 093	1 940	978	784	2.56	3.00	283	263	20
Hawkins County	44 232	17 167	13 223	11 100	1 624	3 944	3 630	1 671	1 334	2.58	2.98	333	299	34
Haywood County	19 249	7 014	5 150	3 566	1 320	1 864	1 708	905	703	2.74	3.29	197	59	138
Henderson County	21 630	8 527	6 446	5 383	820	2 081	1 922	975	765	2.54	2.97	214	212	2
Henry County	27 456	11 362	8 216	6 743	1 128	3 146	2 932	1 676	1 282	2.42	2.88	432	368	64
Hickman County	15 715	5 578	4 808	3 863	528	1 368	1 229	619	506	2.63	3.04	1 039	1 039	-
Houston County	6 842	2 683	2 039	1 706	281	644	604	335	240	2.55	2.98	176	163	13
Humphreys County	15 561	6 083	4 503	3 644	561	1 470	1 373	665	514	2.56	3.01	244	110	134
Jackson County	9 176	3 642	2 782	2 330	334	860	806	475	368	2.52	2.94	121	119	2
Jefferson County	31 415	12 389	9 510	8 018	1 144	2 819	2 533	1 192	940	2.53	2.94	1 601	445	1 156
Johnson County	13 609	5 408	4 081	3 380	580	1 325	1 230	618	484	2.52	2.95	157	145	12
Knox County	323 489	133 630	90 561	71 679	15 479	43 078	36 851	12 902	10 648	2.42	2.97	12 340	3 280	9 061
Lake County	6 607	2 416	1 736	1 330	323	683	625	343	282	2.59	3.09	1 072	1 051	21
Lauderdale County	22 984	8 457	6 381	4 646	1 250	2 072	1 880	1 009	842	2.66	3.15	883	882	1
Lawrence County	34 992	13 336	10 265	8 646	1 281	3 073	2 884	1 596	1 317	2.62	3.08	311	310	1
Lewis County	9 008	3 533	2 606	2 179	328	927	858	451	363	2.58	3.06	149	136	13
Lincoln County	27 910	10 861	8 230	6 872	1 087	2 861	2 455	1 376	1 080	2.57	3.01	347	339	8
Loudon County	30 926	12 155	9 290	7 687	1 301	2 866	2 626	1 227	1 006	2.54	2.96	329	329	-
McMinn County	41 710	16 361	12 458	10 273	1 731	3 883	3 600	1 738	1 425	2.55	2.98	673	446	227
McNairy County	22 180	8 634	6 678	5 588	824	2 156	2 014	1 073	863	2.51	2.96	242	242	-
Macon County	15 817	6 158	4 711	4 007	522	1 446	1 356	707	577	2.57	3.00	89	56	33
Madison County	73 515	28 620	21 301	15 880	4 304	8 308	7 387	3 306	2 584	2.55	3.06	2 467	841	1 626
Marion County	24 645	9 215	7 171	5 838	1 032	2 044	1 873	963	761	2.67	3.08	215	206	9
Marshall County	21 246	8 288	6 130	4 980	881	2 148	1 954	989	779	2.57	3.04	291	229	62
Maury County	54 673	20 608	15 562	12 289	2 632	5 086	4 564	2 082	1 680	2.65	3.07	739	688	51
Meigs County	7 921	2 996	2 333	1 988	261	663	592	255	194	2.64	3.03	112	112	-
Monroe County	29 840	11 303	8 701	7 271	1 163	2 592	2 386	1 167	917	2.63	3.06	601	317	284
Montgomery County	93 516	34 346	26 914	22 284	3 712	7 431	6 229	2 071	1 626	2.72	3.09	6 582	472	6 110
Moore County	4 714	1 734	1 391	1 222	112	343	327	199	136	2.72	3.11	7	7	-
Morgan County	16 011	5 841	4 621	3 746	680	1 220	1 119	558	432	2.74	3.13	1 280	1 280	-
Obion County	31 396	12 412	9 270	7 634	1 279	3 183	2 960	1 586	1 280	2.53	3.00	318	298	20
Overton County	17 436	6 734	5 286	4 404	645	1 448	1 388	748	581	2.59	2.98	201	192	9
Perry County	6 460	2 512	1 905	1 600	186	607	564	300	232	2.57	3.02	152	152	-
Pickett County	4 494	1 786	1 330	1 105	180	456	430	279	184	2.52	2.98	54	49	5
Polk County	13 536	5 092	4 010	3 373	455	1 082	980	519	418	2.66	3.05	106	106	-
Putnam County	48 419	19 753	13 964	11 578	1 913	5 789	4 737	1 945	1 580	2.45	2.93	2 954	534	2 420
Rhea County	23 636	9 186	6 966	5 626	1 088	2 220	2 022	984	779	2.57	3.00	706	410	296
Roane County	46 747	18 433	13 967	11 612	1 831	4 466	4 128	1 970	1 586	2.53	2.96	480	434	46
Robertson County	41 646	14 881	11 966	9 903	1 527	2 915	2 633	1 283	980	2.77	3.14	440	440	-
Rutherford County	113 372	42 118	31 225	25 678	4 272	10 893	8 546	2 971	2 138	2.69	3.14	5 199	1 456	3 743
Scott County	18 180	6 534	5 128	4 138	765	1 406	1 311	684	503	2.78	3.21	180	180	-
Sequatchie County	8 778	3 287	2 555	2 097	363	732	656	322	252	2.67	3.08	85	85	-
Sevier County	50 384	19 520	15 091	12 708	1 663	4 429	3 856	1 561	1 230	2.58	2.96	649	582	67
Shelby County	803 085	303 571	212 075	144 773	56 404	91 496	77 989	25 382	20 265	2.65	3.22	23 246	12 180	11 066
Smith County	13 966	5 388	4 181	3 579	447	1 207	1 127	643	512	2.61	3.00	145	134	11
Stewart County	9 288	3 678	2 812	2 432	251	864	793	444	344	2.53	2.98	184	96	88
Sullivan County	141 449	56 729	42 516	36 372	5 032	14 213	13 046	5 674	4 686	2.49	2.90	2 147	1 381	766
Sumner County	102 685	36 650	29 511	24 887	3 546	7 239	6 364	2 579	2 080	2.77	3.13	1 216	637	579
Tipton County	37 301	13 080	10 345	8 118	1 789	2 686	2 410	1 186	984	2.85	3.27	387	387	-
Trousdale County	5 786	2 261	1 715	1 408	241	546	512	285	207	2.56	3.01	133	100	33
Unicoi County	16 318	6 621	4 938	4 074	663	1 683	1 546	868	703	2.46	2.91	231	220	11
Union County	13 573	4 938	3 982	3 325	506	956	841	385	300	2.75	3.10	121	90	31
Van Buren County	4 841	1 790	1 451	1 189	180	340	322	140	106	2.69	3.06	5	5	-
Warren County	32 307	12 881	9 801	7 981	1 388	3 080	2 824	1 404	1 182	2.57	3.01	395	381	14
Washington County	87 881	35 883	25 371	20 837	3 798	10 448	9 004	3 632	2 946	2.45	2.95	4 424	2 017	2 407
Wayne County	13 709	5 074	4 078	3 440	482	1 096	1 011	551	448	2.65	3.03	226	204	22
Weakley County	29 560	11 982	8 580	7 194	1 076	3 402	2 938	1 473	1 200	2.47	2.95	2 400	476	1 924
White County	19 880	7 722	5 998	4 998	765	1 724	1 622	915	725	2.57	2.98	210	192	18
Williamson County	80 308	27 988	23 094	20 258	2 228	4 832	4 145	1 380	1 117	2.86	3.20	713	699	14
Wilson County	67 110	24 699	19 818	16 719	2 249	4 888	3 910	1 888	1 335	2.70	3.13	565	271	294

REFERENCE 16

K-16

"Rite in the Rain"®

ALL-WEATHER

LEVEL

Notebook No. 311

A0033

Jackson Pit Dump

Memphis Shelby Co., TN

Job No. 9P78

January 12, 1993

1/12/93 Leon Holthaus
TN Dept of Environment's
Conservation, Div of Superfund

Hurricane Creek -
- no flow rate
- intermittent in summer
- no known recreational use
- has sewer discharge

Site Fenced however
holes have been cut in
fence and gate has clearance
under bottom.

Subdivision south of
site has 200 & 250 homes
all within 1/4 mile of site.

Approximately 15 homes within
200 feet (south) of site.

East of Site
x 300 homes 0-1/4 mile
x 100 homes 1/4-1/2 mile
Roper Township - Type Public

(1)

1/12/93
Church with Day care 125
Church w/day care center (East Haven)
200 feet east of site
East Haven Church of Christ

Surface flowing from
southern portion of site
flows into draining along
Jackson Pike Road then
west into Hurricane Creek

Area consists of residential
and light industry.
Convenience store (Wayne)
located at north east
corner of site.

Area Terrain is uneven
and overgrown with grass
shrubs and small trees.

L. Holthaus

(2)

REFERENCE 17

DEPARTMENT OF THE ARMY
MEMPHIS DISTRICT, CORPS OF ENGINEERS
B-202 CLIFFORD DAVIS FEDERAL BUILDING
167 N. MID-AMERICA MALL
MEMPHIS, TENNESSEE 38103-1894

Reply to Attention of:

April 1, 1992

Engineering Division
Hydraulics and Hydrology Branch

Ms. Laura J. Morrisson, Project Scientist
B & V Waste Science & Technology Corporation
1117 Perimeter Center West, Suite W-212
Atlanta, Georgia 30338

Dear Ms. Morrisson:

Reference is made to your letter dated March 25, 1992, and follow-up telephone conversation with Ms. Jancie Hatcher on March 31, 1992, inquiring about water flow information in the Memphis, Tennessee, area.

Please find enclosed the following discharge data for 1990 at Corps of Engineers' gaging locations:

a. Mississippi River at Memphis, Tennessee, River Mile 734.4
b. Loosahatchie River at Brunswick, Tennessee, River Mile 25.3
c. Wolf River at Raleigh, Tennessee, River Mile 9.4

Also enclosed are discharge data for USGS gaging locations from October, 1989, to September, 1990:

a. Nonconnah Creek near Germantown, Tennessee, River Mile 17.3
b. Wolf River at Walnut Grove Road at Memphis, Tennessee, River Mile 15.4
c. Loosahatchie River near Arlington, Tennessee, River Mile 30.4

If we can be of further assistance, please feel free to contact us.

Sincerely,

Dewey L. Jones
Chief, Hydraulics and Hydrology Branch

Enclosures

07031660 WOLF RIVER AT WALNUT GROVE ROAD AT MEMPHIS, TN

LOCATION.--Lat 35°07'58", long 89°51'18", Shelby County, Hydrologic Unit 08010210, on right bank at upstream end of bridge on Walnut Grove Road, 0.5 mi east of Interstate Highway 240, and at mile 15.4.

DRAINAGE AREA.--709 mi^2.

PERIOD OF RECORD.--October 1969 to current year. Prior to September 1977 published as "near Germantown" and Oct. 1978 to Sept. 1986 "at Germantown".

GAGE.--Water-stage recorder. Datum of gage is 225.82 ft above National Geodetic Vertical Datum of 1929. Prior to Apr. 21, 1986 water-stage recorder at site 2.1 mi upstream at datum 9.94 ft higher.

REMARKS.--Records poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data.

AVERAGE DISCHARGE.--21 years, 1,023 ft^3/s, 19.59 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 33,400 ft^3/s, Mar. 14, 1975, gage height, 27.98 ft, site and datum then in use; minimum, 184 ft^3/s, Oct. 8, 9, 12, 13, 1987.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 7,000 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Feb. 5	Unknown	*19,800	*22.92	May 20	1245	7,160	14.78

Minimum discharge, 251 ft^3/s, Sept. 1-3.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	956	377	495	e2400	1870	721	750	e4100	700	392	291	253
2	951	377	470	e2130	5090	690	697	e4000	e670	386	282	251
3	807	370	458	e1700	e8430	698	654	3710	e680	372	284	271
4	710	373	439	1960	e11800	691	618	3440	e630	363	280	259
5	724	383	430	e1510	e17300	661	609	3120	e1100	338	282	261
6	757	405	440	e1410	13300	664	1210	2750	e930	315	282	257
7	687	405	417	e1310	6690	762	1120	1980	e650	317	280	257
8	583	1950	411	e1220	3990	4710	943	1290	e690	320	277	262
9	514	1040	425	1020	2970	3510	745	887	e590	319	274	265
10	469	1030	445	882	5780	3730	697	725	e570	323	273	268
11	440	935	443	761	6820	3060	700	624	e550	347	271	283
12	421	740	433	637	6460	2460	667	612	e540	597	288	e410
13	412	598	442	e586	4380	1930	603	611	e530	432	337	406
14	407	556	452	540	2910	1480	573	633	e522	472	318	328
15	403	564	438	533	4020	3840	562	611	e520	448	329	324
16	991	537	430	518	4290	2390	561	617	e610	389	318	327
17	2810	594	403	623	3240	2440	1080	788	e620	374	316	328
18	1370	627	389	1120	2200	2820	1300	806	e550	349	308	316
19	1070	e550	410	1020	1540	2620	1170	911	e530	343	298	308
20	824	e460	406	1140	1010	1860	903	5220	e520	334	289	309
21	681	e445	e398	1110	804	1270	2730	4020	e522	321	283	318
22	631	e490	e391	1100	1520	906	2360	4780	e560	355	277	338
23	811	e499	e382	900	1520	744	2610	4730	e580	378	271	343
24	558	e740	e387	800	1420	651	2470	3940	e550	384	268	344
25	496	e770	e389	733	1270	606	2200	3160	e490	411	281	350
26	447	e690	e395	e672	1080	581	e1600	2430	e470	378	258	370
27	e425	e640	e385	600	925	578	e1780	1710	e460	352	257	397
28	e415	e610	e387	e602	791	578	e2600	1250	438	337	257	388
29	e405	595	471	e3780	---	585	e3350	981	422	321	257	329
30	e390	532	e2200	e2440	---	1510	e4000	718	404	315	258	318
31	387	---	e2250	e2480	---	974	---	685	---	296	258	---
TOTAL	21752	19683	18753	38417	123180	50731	41882	65839	17988	11388	8761	9432
MEAN	702	656	540	1239	4399	1636	1395	2124	600	367	283	314
MAX	2810	1950	2250	3780	17300	4710	4000	5220	1100	597	337	410
MIN	387	370	389	518	791	578	561	611	404	296	258	251
CFSM	.99	.93	.76	1.75	6.20	2.31	1.97	3.00	.85	.52	.40	.44
IN.	1.14	1.03	.88	2.02	6.48	2.66	2.20	3.45	.94	.60	.46	.49

CAL YR 1989 TOTAL 360214 MEAN 1535 MAX 14900 MIN 350 CFSM 2.16 IN. 29.39
WTR YR 1990 TOTAL 425796 MEAN 1167 MAX 17300 MIN 251 CFSM 1.65 IN. 22.34

e Estimated

07030240 LOOSAHATCHIE RIVER NEAR ARLINGTON, TN

LOCATION.--Lat 35°18'37", long 89°38'23", Shelby County, Hydrologic Unit 08010209, on left bank 20 ft downstream from bridge on U.S. Highways 70 and 79, 1.5 mi upstream from Beaver Creek, 1.5 mi northeast of Arlington, and at mile 30.4.

DRAINAGE AREA.--262 mi^2.

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Datum of the gage is 246.43 ft above National Geodetic Vertical Datum of 1929.

REMARKS.--Records poor. Periodic observations of water temperature and specific conductance are published in this report as miscellaneous water quality data.

AVERAGE DISCHARGE.--21 years, 378 ft^3/s, 19.59 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 27,400 ft^3/s, Dec. 25, 1987, gage height, 25.27 ft; minimum, 66 ft^3/s, Apr. 6, 7, 1974.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 5,500 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
Nov. 8	0900	6,850	17.15	Feb. 15	2400	6,330	16.52
Jan. 29	Unknown	Unknown	Unknown	Mar. 8	1200	7,360	17.66
Feb. 4	Unknown	*14,500	*22.11	Apr. 21	1315	5,540	17.58
Feb. 10	Unknown	Unknown	Unknown				

Minimum discharge, 97 ft^3/s, several days.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	534	126	115	486	273	353	172	235	e150	107	101	97
2	223	124	115	232	5400	360	168	1660	e150	105	101	97
3	163	123	111	197	8900	348	163	951	e400	105	101	97
4	146	123	110	1120	e12000	328	140	498	e220	103	101	98
5	141	123	110	403	e2350	316	134	190	e170	100	101	98
6	137	138	110	216	820	312	228	173	e145	100	101	98
7	134	304	114	172	634	320	232	170	e140	100	101	98
8	131	5320	114	169	564	4840	159	168	e135	99	101	98
9	130	2200	112	157	947	2810	146	155	e132	99	101	98
10	128	399	110	141	e6700	599	152	143	e128	99	101	102
11	126	211	108	132	e2330	306	178	147	e128	103	101	128
12	125	176	106	125	732	508	151	175	e127	140	101	108
13	124	164	105	117	545	697	140	163	e125	157	102	102
14	124	159	104	116	456	271	138	141	e122	117	102	100
15	123	168	103	115	2900	3340	138	139	e121	108	102	103
16	304	182	100	113	4650	1550	138	138	e120	106	102	100
17	2310	152	100	302	e1100	427	1140	185	e119	104	102	98
18	343	142	100	943	576	298	791	170	e118	103	102	98
19	199	137	100	380	493	243	241	193	e117	104	102	98
20	170	136	101	500	426	211	188	e3570	e116	104	102	98
21	154	133	100	323	396	198	3520	e1600	e114	103	101	99
22	148	327	97	185	1720	189	3140	e700	e160	103	100	100
23	141	490	97	152	856	182	526	e400	e130	103	100	99
24	138	192	97	137	515	175	248	e250	e119	102	100	97
25	134	153	97	144	409	170	203	217	e112	102	99	97
26	131	140	99	126	375	165	181	193	e112	102	99	97
27	130	133	99	114	362	160	326	187	e111	102	99	97
28	128	127	98	346	352	158	5370	182	e110	102	99	97
29	127	118	105	e3810	---	163	2580	162	108	102	98	97
30	127	117	698	e1310	---	754	396	161	108	102	98	97
31	127	---	2180	392	---	278	---	e143	---	102	97	---
TOTAL	7300	12539	5915	13275	57761	21027	21426	13559	4169	3288	3118	2982
MEAN	235	418	191	428	2064	678	714	437	139	106	101	99.7
MAX	2310	5320	2180	3910	12000	4840	5370	3570	400	157	102	128
MIN	123	117	97	113	273	158	134	138	108	99	97	97
CFSM	.90	1.60	.73	1.63	7.88	2.59	2.73	1.67	.53	.40	.38	.38
IN.	1.04	1.78	.84	1.88	8.20	2.98	3.04	1.93	.59	.47	.44	.42

CAL YR 1989 TOTAL 227119 MEAN 622 MAX 13000 MIN 84 CFSM 2.37 IN. 32.25
WTR YR 1990 TOTAL 166389 MEAN 456 MAX 12000 MIN 97 CFSM 1.74 IN. 23.62

e Estimated

MISSISSIPPI RIVER AT MEMPHIS, TENN.

COMPUTED DAILY DISCHARGE IN THOUSAND CUBIC FEET PER SECOND

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	196	601	1120	666	539	1113	649	452	409	238	435	325
2	203	621	1102	643	517	1106	634	422	408	249	422	336
3	222	664	1068	618	497	1103	635	406	407	240	394	358
4	270	715	1010	585	482	1104	614	409	401	238	357	372
5	349	766	922	557	483	1103	592	415	392	230	322	383
6	443	830	814	534	496	1101	577	406	379	225	293	406
7	527	883	722	503	511	1094	560	398	368	227	279	451
8	611	928	683	481	541	1081	542	395	363	240	272	503
9	642	963	676	464	601	1060	524	395	366	252	273	536
10	658	992	645	452	655	1036	514	402	362	260	276	550
11	661	1003	609	439	685	1010	510	410	352	263	275	551
12	648	1009	592	433	685	979	511	413	350	269	279	540
13	619	1013	580	444	664	947	507	406	352	286	285	519
14	580	1017	572	466	633	908	504	389	341	301	299	482
15	537	1029	585	487	611	869	509	375	321	311	319	444
16	504	1052	607	507	604	832	516	364	307	312	337	407
17	485	1066	623	525	618	794	521	352	303	321	347	380
18	471	1081	654	552	660	743	533	340	300	343	354	356
19	445	1103	723	564	743	688	555	334	293	371	351	398
20	418	1125	796	573	850	651	574	326	288	396	344	438
21	403	1141	852	573	933	649	582	318	283	410	333	574
22	428	1154	888	556	990	670	587	316	281	411	315	705
23	483	1155	917	532	1037	676	587	323	285	400	298	812
24	539	1150	925	514	1074	674	577	341	287	392	290	911
25	585	1142	923	516	1102	673	561	365	281	393	286	972
26	614	1134	912	527	1116	679	543	389	273	401	289	1021
27	625	1126	886	535	1121	682	534	411	268	413	298	1078
28	627	1124	841	552	1120	688	533	423	268	422	315	1131
29	624		778	566	1118	689	527	428	267	427	320	1166
30	620		722	560	1116	680	510	429	264	429	321	1198
31	615		691		1112		484	423		433		1232
MEAN	505	985	788	530	771	869	553	386	327	326	319	631
MAX	661	1155	1120	666	1121	1113	649	452	409	433	439	1232
MIN	196	601	572	433	482	649	484	316	264	229	272	325

TOTAL DISCHARGE FOR YEAR WAS 211827 MEAN DISCHARGE FOR YEAR WAS 580

MAXIMUM DISCHARGE WAS 1,242,243 CFS ON DEC. 31.
MINIMUM DISCHARGE WAS 194,180 CFS ON JAN. 1.

MISSISSIPPI RIVER AT MEMPHIS, TENN.

LOCATION. LAT. 35-07-23, LONG. 90-04-36. MILE 734.4, APPROXIMATELY EIGHTEEN HUNDRED FEET DOWNSTREAM FROM HARAHAN BRIDGE.

GAGE. AUTOMATIC RECORDER ON SOUTHWEST CORNER OF AMERICAN COMMERCIAL LIQUID TERMINAL OIL DOCK AT 427 WEST ILLINOIS AVENUE.

GENERAL INFORMATION. DRAINAGE AREA (REVISED), 928,700 SQUARE MILES. BANKFULL STAGE, 34 FEET. LOW WATER REFERENCE PLANE, MINUS 2.6 FEET ON GAGE. THE AVERAGE RELATION BETWEEN BEALE STREET GAGE AND GAGE NEAR BRIDGE IS A STRAIGHT LINE YIELDING STAGES ON THE BRIDGE GAGE THE SAME AT ZERO STAGE, AND 1.6 FEET LOWER AT THE 50 FOOT STAGE.

RECORDS AVAILABLE. STAGE, OCT. 1934 TO SEPT. 1951 AND OCT. 1952 TO DATE IN REPORTS OF U.S. GEOLOGICAL SURVEY. DEC. 1934 TO DATE IN REPORTS OF THE NATIONAL WEATHER SERVICE. (WEATHER SERVICE STAGES FROM DEC. 1890 TO AUG. 1932 REFER TO BEALE ST. GAGE, AND FROM SEPT. 1932 TO DEC. 1934 TO GAGE AT SITE 1,000 FEET DOWNSTREAM.) SINCE 1950 IN REPORTS OF THE CORPS OF ENGINEERS. MEASURED DISCHARGE, INTERMITTENTLY FROM 1882 TO 1904, AND 1932 TO DATE. DAILY DISCHARGE, JAN. 1933 TO DATE. ALSO IN REPORTS OF THE GEOLOGICAL SURVEY.

EXTREMES. HIGHEST, 48.7 FEET ON FEB. 10, 1937. LOWEST, MINUS 10.70 FEET ON JUL. 10 AND 11, 1988. MAXIMUM, 2,020,000 CFS WAS MEASURED ON FEB. 7, 1937 (STAGE, 48.3). MINIMUM, 78,000 CFS ON AUG. 25, 1936 (STAGE, 0.0).

DAILY EIGHT A.M. STAGE IN FEET — GAGE ZERO, 183.91 FEET, N.G.V.D. OF 1929

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	-3.4	16.5	31.1	18.3	14.7	30.2	18.4	11.3	8.3	1.6	9.6	3.8
2	-2.9	17.1	30.6	17.6	13.9	30.2	18.1	9.9	8.1	1.2	9.1	4.5
3	-1.9	18.1	29.9	16.8	13.1	30.4	17.6	9.0	8.2	0.6	8.1	5.5
4	0.7	19.7	28.7	15.7	12.3	30.8	17.0	9.0	7.9	0.6	6.5	6.5
5	4.4	21.0	26.6	14.8	12.3	30.7	16.3	9.4	7.5	0.0	4.7	7.0
6	8.6	22.7	23.9	14.1	12.6	30.6	15.9	9.1	7.0	-0.4	3.1	7.8
7	11.5	24.1	21.2	13.1	13.2	30.4	15.5	8.6	6.6	-0.5	2.3	9.8
8	14.4	25.2	19.5	12.1	14.0	30.1	14.9	8.4	6.2	0.6	1.9	12.2
9	15.5	26.1	19.1	11.4	16.1	29.5	14.4	8.3	6.3	1.5	1.8	13.6
10	16.3	26.9	19.1	10.9	18.2	29.0	13.9	8.5	6.3	2.2	2.0	14.3
11	16.6	27.3	16.9	10.5	19.4	28.3	13.6	8.8	5.8	2.5	1.9	14.5
12	16.5	27.5	16.2	10.1	19.7	27.6	13.5	9.0	5.6	2.8	2.0	14.2
13	15.7	27.8	15.7	10.6	19.1	26.9	13.3	8.8	5.9	3.7	2.2	13.7
14	14.6	27.9	15.2	11.4	18.2	26.0	12.9	7.8	5.5	4.4	2.7	12.4
15	13.2	28.1	15.3	12.1	17.2	25.1	13.0	7.2	4.5	5.0	3.6	10.8
16	12.2	28.9	16.1	12.6	16.8	24.3	13.1	6.6	3.6	4.9	4.6	9.2
17	11.6	29.1	16.6	13.2	17.1	23.4	13.2	5.9	3.4	5.1	5.1	7.8
18	11.2	29.3	17.2	14.3	18.1	22.1	13.4	5.3	3.4	6.0	5.5	7.7
19	10.0	29.8	19.3	14.8	20.4	20.5	14.0	5.1	3.0	7.3	5.3	8.3
20	8.8	30.2	21.4	15.3	23.4	19.3	14.6	4.8	2.8	8.4	4.9	9.4
21	7.9	30.6	22.9	15.4	25.4	18.8	14.8	4.4	2.5	9.0	4.3	14.1
22	8.6	31.0	23.8	15.2	26.9	19.3	14.9	4.3	2.3	9.0	3.3	19.0
23	11.1	31.2	24.5	14.3	28.1	19.2	14.8	4.6	2.6	8.5	2.1	21.9
24	13.4	31.3	24.8	13.6	29.1	18.9	14.6	5.6	2.8	7.9	1.7	24.7
25	15.2	31.2	24.9	13.6	29.8	18.5	14.3	6.6	2.5	7.8	1.3	26.2
26	16.3	31.1	24.7	14.0	30.2	18.4	13.7	7.5	2.1	8.0	1.2	27.4
27	16.9	31.1	24.2	14.3	30.3	18.4	13.5	8.3	1.8	8.5	1.7	28.7
28	17.3	31.1	23.2	14.9	30.3	18.7	13.6	8.9	1.8	8.8	2.8	29.9
29	17.7		21.6	15.5	30.3	18.9	13.6	9.2	1.9	9.0	3.3	30.8
30	17.6		20.1	15.4	30.2	18.7	13.3	9.2	1.8	9.1	3.5	31.3
31	17.2		19.0		30.2		12.4	9.0		9.3		32.1

THE FOLLOWING REFER ONLY TO READINGS APPEARING IN THE TABLE ABOVE.

MEAN	11.38	26.85	21.71	13.87	20.98	24.45	14.91	7.69	4.60	4.92	3.74	15.45
MAX.	17.7	31.3	31.1	18.3	30.3	30.8	18.4	11.3	8.3	9.3	9.6	32.1
MIN.	-3.4	16.5	15.2	10.1	12.3	18.4	12.4	4.3	1.8	-0.5	1.2	3.8

HIGHEST STAGE WAS 32.43 ON DEC 31.
LOWEST STAGE WAS -3.46 ON JAN 1.

LOOSAHATCHIE RIVER AT BRUNSWICK, TENN.

COMPUTED DAILY DISCHARGE IN CUBIC FEET PER SECOND

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1					438							
2	493											
3										79		
4												
5												
6		783						115			126	
7					319							
8								123				
9							140			220		
10									112			
11												
12			492									
13		529										
14					201							
15												
16		10100		270								
17	228											345
18									116			
19												7016
20												
21		331			3173							
22												
23				1043			138					
24								121				
25										109		
26	283										142	
27								122				
28												
29					168					100		
30												
31												
MEAN												
MAX.												
MIN.												

A-NO RECORD.
YEARLY RECORD INCOMPLETE.
DISCHARGE VALUES SHOWN ARE ACTUAL DISCHARGE OBSERVATIONS.

LOOSAHATCHIE RIVER AT BRUNSWICK, TENN.

LOCATION. LAT. 35-16-52, LONG. 89-45-50. MILE 25.3, HIGHWAY BRIDGE ABOUT A MILE NORTH OF BRUNSWICK. THE MOUTH OF LOOSAHATCHIE RIVER IS 740.6 MILES UPSTREAM ON THE MISSISSIPPI RIVER FROM HEAD OF PASSES.

GAGE. STAGE DETERMINED FROM MARK ON GUARDRAIL ON UPSTREAM SIDE OF BRIDGE.

GENERAL INFORMATION. DRAINAGE AREA, 506 SQUARE MILES. BANKFULL STAGE, 21 FEET. DUE TO CHANNEL IMPROVEMENTS IN 1976, USING AN AUTOMATIC RECORDER ON THIS BRIDGE BECAME IMPRACTICAL.

RECORDS AVAILABLE. STAGE, JAN. 12, 1939, TO JUN. 28, 1976. STAGES PUBLISHED FROM JUN. 28, 1976, TO DATE ARE MEAN STAGES FOR TIME OF DISCHARGE OBSERVATION. COMPUTED DAILY DISCHARGE, 1939 TO JUN. 28, 1976. DISCHARGE VALUES FROM JUN. 28, 1976 TO DATE ARE ACTUAL DISCHARGE OBSERVATIONS.

EXTREMES. HIGHEST, 28.9 FEET, FROM WATERMARK, IN JAN. 1939. LOWEST OBSERVED STAGE, 4.01 FEET ON AUG 15, 1988. MAXIMUM, 39,700 CFS OBSERVED ON JAN. 9, 1946 (STAGE, 25.81). DISCHARGE NOT DETERMINED FOR RECORD HIGH STAGE. MINIMUM, 46 CFS COMPUTED FOR JUL. 16, 1944, AND SUBSEQUENT DAYS.

DAILY EIGHT A.M. STAGE IN FEET — GAGE ZERO, 227.23 FEET, N.G.V.D. OF 1929

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	A	A	A	A	5.7	A	A	A	A	A	A	A
2	5.0	A	A	A	A	A	A	A	A	A	A	A
3	A	A	A	A	A	A	A	A	A	4.3	A	A
4	A	A	A	A	A	A	A	A	A	A	A	A
5	A	A	A	A	A	A	A	A	A	A	A	A
6	A	7.1	A	A	A	A	A	4.3	A	A	4.3	A
7	A	A	A	A	4.8	A	A	A	A	A	A	A
8	A	A	A	A	A	A	A	4.3	A	A	A	A
9	A	A	A	A	A	A	4.3	A	A	4.5	A	A
10	A	A	A	A	A	A	A	A	4.3	A	A	A
11	A	A	A	A	A	A	A	A	A	A	A	A
12	A	A	5.3	A	A	A	A	A	A	A	A	A
13	A	5.9	A	A	A	A	A	A	A	A	A	A
14	A	A	A	A	4.6	A	A	A	A	A	A	A
15	A	A	A	A	A	A	A	A	A	A	A	A
16	A	19.7	A	4.4	A	A	A	A	A	A	A	A
17	4.2	A	A	A	A	A	A	A	A	A	A	4.7
18	A	A	A	A	A	A	A	A	4.3	A	A	A
19	A	A	A	A	A	A	A	A	A	A	A	18.3
20	A	A	A	A	A	A	A	A	A	A	A	A
21	A	4.8	A	A	12.4	A	A	A	A	A	A	A
22	A	A	A	A	A	A	A	A	A	A	A	A
23	A	A	A	7.1	A	A	4.3	A	A	A	A	A
24	A	A	A	A	A	A	A	4.3	A	A	A	A
25	A	A	A	A	A	A	A	A	A	4.3	A	A
26	4.4	A	A	A	A	A	A	A	A	A	4.3	A
27	A	A	A	A	A	A	A	4.3	A	A	A	A
28	A		A	A	A	A	A	A	A	A	A	A
29	A		A	A	4.9	A	A	A	A	4.3	A	A
30	A		A		A		A	A		A		A
31												

THE FOLLOWING REFER ONLY TO READINGS APPEARING IN THE TABLE ABOVE

MEAN
MAX.
MIN.

A-NO RECORD.
YEARLY RECORD INCOMPLETE.
STAGES SHOWN ARE MEAN STAGES FOR TIME OF DISCHARGE OBSERVATIONS.

WOLF RIVER AT RALEIGH, TENN.

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	2229	2297	1330	1944	4371			291				
2	2117	7201	1205	1897	5280			299				
3	1925	11368	1122	1849	4510			306		1292		1630
4	2566	12531	1015	1802	4179			313		1628		
5	1761	15195	895	1754	3930			320		1008	385	
6	1612	16095	747	1725	3731			328		932		
7	1448	9994	807		2903			319				
8	1264	6093	5026		2257			311				
9	1102	4895	2906		2090		380					
10		8384	3300						288			
11		8354	3163			997			318			335
12		8651	3044						341			429
13		5849	2552									
14		3970	2124		794						476	
15		3435	3202									
16		6079	3118	713								
17	966	3964	3006	1610								1403
18	1332	2699	3260	2120		537			302			4020
19	1167	1982	3168		1183							4673
20	1166	1479	2394		3670			309				5853
21	1106	1041	2100	3815	3492			304				12280
22		1506	1952	2732	4894	1205		302				13994
23		1541		3040	4786	962	477	301				13313
24		1531		2829	4023	817		301				10529
25		1498		2543	3229	687				383		6758
26	658	1415		2147	2609	608				371	389	4890
27	829	1397		2246	2353					358		3547
28	1320	1356		5259	2146					344		4805
29	5129			3070	1419					334		4072
30	2781		2378	3860	920							3667
31	2944		2067									3968
MEAN		5500										
MAX		16095										
MIN		1041										

MAXIMUM DISCHARGE WAS 17,538 CFS ON FEB. 6.
MINIMUM DISCHARGE WAS NOT DETERMINED.

WOLF RIVER AT RALEIGH, TENN.

LOCATION. LAT. 35-12-08, LONG. 89-55-24. MILE 9.4. AUSTIN PEAY HIGHWAY BRIDGE. THE MOUTH OF WOLF RIVER IS 738.6 MILES UPSTREAM ON THE MISSISSIPPI RIVER FROM HEAD OF PASSES.

GAGE. AUTOMATIC RECORDER ON BRIDGE.

GENERAL INFORMATION. DRAINAGE AREA, 770 SQUARE MILES. BANKFULL STAGE, 12 FEET. DISCHARGE IS AFFECTED BY BACKWATER DURING HIGH MISSISSIPPI RIVER STAGES. RIVER CONDITIONS HAVE CHANGED SINCE 1962 DUE TO CHANNEL ENLARGEMENT AND REALIGNMENT OPERATIONS.

RECORDS AVAILABLE. STAGE, MAY 12, 1936, TO DATE. PRIOR TO NOV. 22, 1940, GAGE WAS 700 FEET DOWNSTREAM. COMPUTED DAILY DISCHARGE, 1936 TO DATE.

EXTREMES. HIGHEST, 23.72 FEET, FROM WATERMARK, ON JAN. 20, 1935. LOWEST, MINUS 5.93 FEET ON OCT. 13, 1963. MAXIMUM, 41,400 CFS COMPUTED FOR JAN. 9, 1946 (STAGE 20.4). DISCHARGE NOT DETERMINED FOR RECORD HIGH STAGE. MINIMUM, NO FLOW FROM JAN. 30 TO FEB. 9, 1937, BECAUSE OF BACKWATER.

DAILY EIGHT A.M. STAGE IN FEET — GAGE ZERO, 217.22 FEET, N.G.V.D. OF 1929

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0.1	0.5	0.7	E 0.1	3.2	A	A	-3.3	A	A	A	A
2	0.1	7.3	0.3	E 0.0	2.8	A	A	E -3.3	A	A	A	A
3	-0.4	8.3	0.1	E 0.0	2.1	A	A	E -3.4	A	-3.6	A	0.3
4	0.9	9.1	-0.3	E -0.1	2.7	A	A	E -3.4	A	0.9	A	A
5	-0.4	10.8	-0.6	E -0.2	2.3	A	A	E -3.4	A	-0.8	-3.2	A
6	-0.5	12.5	-1.2	-0.3	2.1	A	A	-3.4	A	E -1.0	A	A
7	-0.8	8.6	-1.3	A	1.3	A	A	-3.4	A	A	A	A
8	-0.9	5.3	4.8	A	0.2	A	A	-3.4	A	A	A	A
9	-1.4	3.5	1.5	A	0.0	A	-3.2	A	A	A	A	A
10	A	8.3	2.3	A	A	A	A	A	-3.6	A	A	A
11	A	6.7	2.0	A	A	-1.1	A	A	-3.4	A	A	-3.0
12	A	7.3	1.7	A	A	A	A	A	-3.3	A	A	-2.0
13	A	5.5	1.2	A	A	A	A	A	A	A	A	A
14	A	3.0	0.5	A	-2.1	A	A	A	A	A	-2.9	A
15	A	3.4	5.1	A	A	A	A	A	A	A	A	A
16	A	6.2	1.7	-2.9	A	A	A	A	A	A	A	A
17	-2.7	3.3	1.6	-0.9	A	A	A	A	A	A	A	-1.5
18	-0.8	2.3	1.8	0.3	A	-2.5	A	A	-3.5	A	A	2.1
19	-1.4	1.6	1.9	A	-2.0	A	A	A	A	A	A	0.6
20	-1.2	1.2	1.0	A	3.1	A	A	-3.4	A	A	A	3.9
21	-1.4	0.8	0.5	0.2	1.1	A	A	E -3.4	A	A	A	6.9
22	A	1.4	0.2	1.0	4.1	-0.1	A	E -3.5	A	A	A	9.7
23	A	1.4	A	1.6	4.2	E -1.3	-2.9	E -3.5	A	A	A	9.5
24	A	1.4	A	1.2	3.5	E -1.7	A	-3.5	A	A	A	8.2
25	A	1.3	A	1.0	2.8	E -2.1	A	A	A	-3.2	A	5.4
26	-2.5	1.0	A	0.5	2.1	-2.5	A	A	A	E -3.2	-3.3	4.5
27	-2.0	0.9	A	0.3	1.8	A	A	A	A	E -3.3	A	4.0
28	-1.6	0.7	A	5.6	1.7	A	A	A	A	E -3.3	A	4.0
29	4.6		A	1.6	1.4	A	A	A	A	-3.4	A	3.8
30	1.1		1.6	2.4	-0.4	A	A	A	A	A	A	3.8
31	1.4		0.3		A		A	A		A		5.3

THE FOLLOWING REFER ONLY TO READINGS APPEARING IN THE TABLE ABOVE.

MEAN	4.40
MAX.	12.5
MIN.	0.5

A- NO RECORD.
E- ESTIMATED.
HIGHEST STAGE WAS 12.50 ON FEB. 6.
LOWEST STAGE WAS NOT DETERMINED.

07032200 NONCONNAH CREEK NEAR GERMANTOWN, TN

LOCATION.--Lat 35°02'59", long 89°49'08", Shelby County, Hydrologic Unit 08010211, on left bank at downstream side of bridge on Winchester Road, 2.6 mi south of Germantown, and at mile 17.3.

DRAINAGE AREA.--68.2 mi^2.

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1959-1964, 1968; October 1968 to May 1985, October 1985 to current year.

REVISED RECORDS.--WRD TN-74-1: Drainage area, WRD TN-87-1 (P).

GAGE.--Water-stage recorder. Datum of gage is 262.92 ft above National Geodetic Vertical Datum of 1929 (levels by Soil Conservation Service).

REMARKS.--Records fair. Periodic observations of water temperature are published in this report as miscellaneous water quality data.

AVERAGE DISCHARGE.--20 years (water years 1970-84, 1986-90), 107 ft^3/s, 21.29 in/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,100 ft^3/s, July 2, 1989, gage height 24.23 ft, maximum gage height 27.11 ft, Mar. 12, 1975; no flow at times most years.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 3,700 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)
Oct. 16	2145	5,910	16.62
Feb. 3	Unknown	*Unknown	*Unknown
Feb. 10	Unknown	Unknown	Unknown
Feb. 15	2345	4,830	15.05
Mar. 8	Unknown	Unknown	Unknown
Mar. 15	Unknown	Unknown	Unknown
Apr. 21	0615	5,070	15.41
Apr. 28	0230	4,260	14.17
May 20	0845	6,750	17.78

Minimum discharge, .01 ft^3/s, Sept. 28, 29, 30.

DISCHARGE, CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	.62	.64	100	78	126	52	47	2.0	.38	1.7	.43
2	8.6	4.7	.78	34	2380	168	28	1140	3.0	2.2	1.4	.34
3	3.2	3.8	.83	49	4360	141	e20	207	135	2.2	1.1	.42
4	3.0	1.3	.69	360	962	95	e9.1	178	27	.55	1.0	.29
5	1.8	1.8	.59	83	107	75	e7.3	86	10	5.4	1.0	.27
6	1.3	15	.47	38	51	63	e338	30	4.4	.98	.84	.33
7	1.1	4.1	.31	28	37	e254	e160	17	1.9	.38	.55	.40
8	1.8	394	2.1	44	29	e3660	e64	12	1.1	.49	.98	.65
9	.93	59	2.2	31	369	585	31	9.1	2.7	.41	.68	.98
10	.98	17	1.2	19	e2180	294	e16	8.1	28	.25	.74	.63
11	1.6	11	.78	13	204	188	e8.7	10	9.7	.28	.53	.61
12	1.8	3.8	.58	8.8	58	137	e5.8	24	2.8	67	.41	13
13	2.3	2.7	.40	5.8	37	122	e4.2	18	.88	13	61	49
14	2.1	1.6	.33	3.9	28	108	e3.6	10	.58	3.5	10	3.7
15	2.1	8.2	.28	3.2	1520	e2000	e3.0	8.1	77	1.3	1.8	.74
16	692	15	.23	3.0	e1280	e281	e3.0	3.7	22	.77	.68	.48
17	1310	3.9	.30	75	87	83	e318	28	5.5	.50	.28	.26
18	46	3.4	.33	248	42	45	154	8.5	1.4	.31	.73	.20
19	20	2.0	5.6	99	33	31	38	298	.70	.56	.77	3.8
20	9.4	1.7	1.8	190	25	24	99	3360	.46	.59	.75	1.1
21	5.1	1.0	.87	77	20	20	2620	602	.46	.69	.35	2.2
22	3.8	52	.28	34	e683	16	270	89	406	10	.47	8.7
23	3.2	42	.11	21	258	16	57	25	24	34	.49	.83
24	2.5	18	.03	15	134	12	34	14	7.4	14	.81	.30
25	1.5	8.1	.06	31	84	12	28	7.4	5.3	3.0	.46	.13
26	1.4	3.6	.30	16	78	16	18	4.8	1.9	.82	.45	.09
27	1.5	2.8	.45	10	65	12	252	10	.73	.54	.48	.06
28	.85	3.5	.34	328	59	20	1650	15	.57	.55	.38	.02
29	.58	1.3	8.4	1600	---	25	136	8.0	.50	.76	.40	.01
30	.78	.74	400	171	---	784	44	3.8	.42	7.5	.31	.01
31	.80	---	707	47	---	151	---	2.0	---	3.8	.31	---
TOTAL	2152.88	685.76	1138.07	3788.8	15228	8504	6467.7	6280.4	783.78	176.55	111.87	90.89
MEAN	69.4	22.9	36.7	122	544	307	216	203	26.1	5.70	3.61	3.00
MAX	1310	394	707	1600	4360	3660	2620	3360	406	67	61	49
MIN	.56	.62	.03	3.0	20	12	3.0	2.0	.42	.25	.28	.01
CFSM	1.02	.34	.54	1.79	7.97	4.50	3.16	2.97	.38	.08	.05	.04
IN.	1.17	.37	.62	2.07	8.31	5.18	3.53	3.43	.43	.10	.06	.05

CAL YR 1989 TOTAL 62128.00 MEAN 170 MAX 5900 MIN .03 CFSM 2.50 IN. 33.89
WTR YR 1990 TOTAL 46407.01 MEAN 127 MAX 4360 MIN .01 CFSM 1.86 IN. 25.31

e Estimated

(10)

REFERENCE 18

B&V WASTE SCIENCE AND TECHNOLOGY CORP.

TELEPHONE MEMORANDUM

Site Assessment
Old Osmose Chemical Facility

BVWST Project 52012.022
October 18, 1991
2:35 p.m.

Surface Water Intakes on the Mississippi River
Groundwater Drinking Water Population

To: Jerry Collins
Company: Department of Memphis Public Works
Phone No.: (901) 576-6720

Recorded by: Laura Morrison lm 10-18-91

Surface Water Intakes on the Mississippi River

There are no surface water intakes on the Mississippi River. rivers, streams and lakes flowing into the Mississippi river in the Memphis area have no surface water intakes.

REFERENCE 19

B&V WASTE SCIENCE AND TECHNOLOGY CORP.

TELEPHONE MEMORANDUM

BVWST Project 52012.012
February 7, 1992
4:00 p.m.

Irrigation in the Memphis area

From: Troy Taylor
Company: Shelby County Soil Conservation Service
Phone No.: (901) 766-7650

Recorded by: Jancie S. Hatcher

Mr. Taylor informed me that he was aware of 3 areas of irrigation in the Shelby County area:

1. Irrigation at the Agricultural Office at the corner of Walnut Grove and Germantown Road - intake is from a nearby pond

2. Irrigation off Highway 14 (also called Austin Peay Hwy.) near Gragg Road in the northern part of Shelby County - intake from a groundwater well

3. Irrigation for agriculture on Island No. 40 (west of Memphis) - intake from the Mississippi River

OVERSIZED

DOCUMENT

REFERENCE 21

LIST OF RARE AND ENDANGERED SPECIES FOR SW MEMPHIS QUAD
16 DEC 1992

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	BSD STATUS
OTHERS				
HERON ROOKERY				
VERTEBRATES				
CNEMIDOPHORUS SEXLINEATUS	SIX-LINED RACERUNNER		D	S
ICTINIA MISSISSIPPIENSIS	MISSISSIPPI KITE		E	E
MELANERPES ERYTHROCEPHALUS	RED-HEADED WOODPECKER		D	S
NYCTANASSA VIOLACEA	YELLOW-CROWNED NIGHT-HERON			T
THRYOMANES BEWICKII	BEWICK'S WREN		T	T

6 Records Processed

EOR	SNAME	QUADNAME	MARGNUM	MANAME	SITENAME
QT10.500IE'018'TN	HERON ROOKERY	SOUTHWEST MEMPHIS	0		
ARACJ02110'076'TN	CHENIDOPHORUS SEXLINEATUS	SOUTHWEST MEMPHIS	1		
ARACJ02110'075'TN	CHENIDOPHORUS SEXLINEATUS	SOUTHWEST MEMPHIS	2		
ABNTP04040'039'TN	HELANERPES ERYTHROCEPHALUS	SOUTHWEST MEMPHIS	3		
ABPBG07010'026'TN	THRYOMANES BEWICKII	SOUTHWEST MEMPHIS	3		
ABNKC09010'016'TN	ICTINIA MISSISSIPPIENSIS	SOUTHWEST MEMPHIS	4		
ABNGA13010'007'TN	NYCTANASSA VIOLACEA	SOUTHWEST MEMPHIS	5	T. O. FULLER STATE RECREATION PARK	
ARACJ02110'089'TN	CHENIDOPHORUS SEXLINEATUS	SOUTHWEST MEMPHIS	6		
ABNGA13010'006'TN	NYCTANASSA VIOLACEA	SOUTHWEST MEMPHIS	7	RIVERSIDE PARK	
ABNGA13010'008'TN	NYCTANASSA VIOLACEA	SOUTHWEST MEMPHIS	8		
ABNGA13010'009'TN	NYCTANASSA VIOLACEA	SOUTHWEST MEMPHIS	9		

11 Records Processed

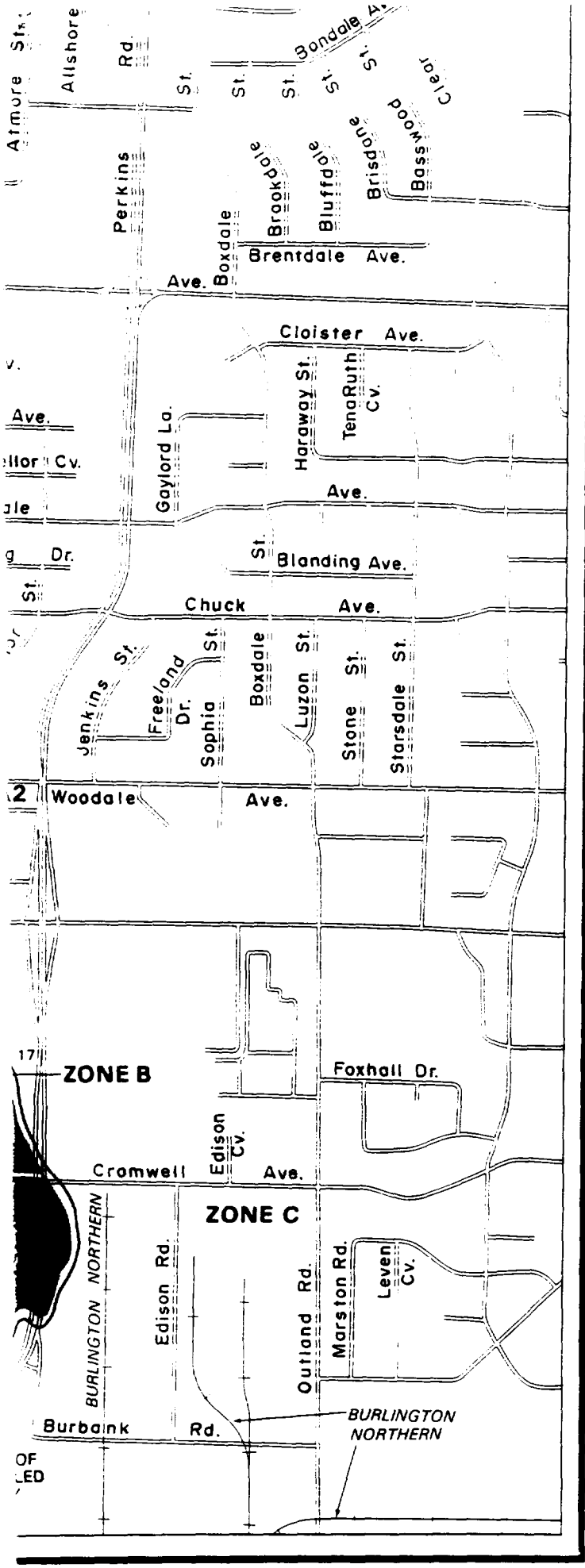
BOR	SNAME	QUADNAME	MARGNUM	MANAME	SITENAME
ARACJ02110*077*TN	CHEMIDOPHORUS SEXLINEATUS	SOUTHEAST MEMPHIS	1		
ARACJ02111*018*TN	CHEMIDOPHORUS SEXLINEATUS SEXLINEAT	SOUTHEAST MEMPHIS	2		

2 Records Processed

LIST OF RARE AND ENDANGERED SPECIES FOR SE MEMPHIS QUAD
16 DEC 1992

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	ESD STATUS
VERTEBRATES				
CNEMIDOPHORUS SEXLINEATUS	SIX-LINED RACERUNNER		D	S

1 Records Processed



To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

CITY OF
MEMPHIS,
TENNESSEE
SHELBY COUNTY

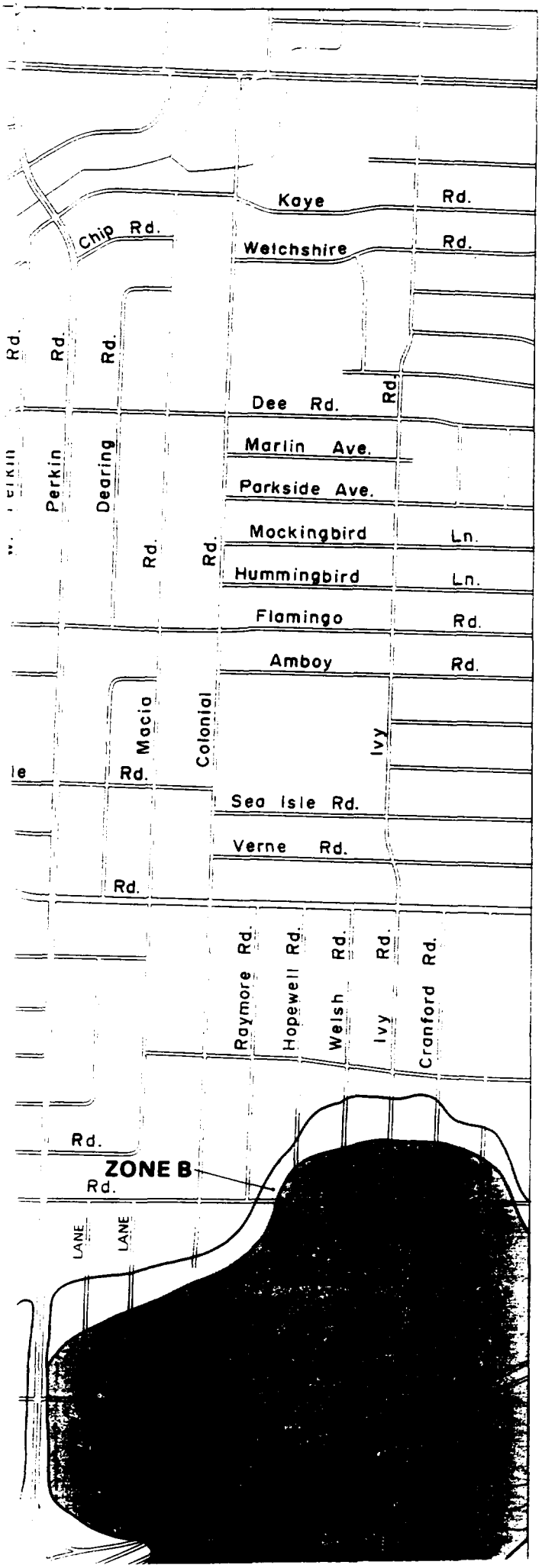
PANEL 55 OF 80

REFERENCE 22

COMMUNITY-PANEL NUMBER
470177 0055 C

MAP REVISED:
AUGUST 19, 1985

Federal Emergency Management Agency



KEY TO MAP

500-Year Flood Boundary	
100-Year Flood Boundary	ZONE B
Zone Designations*	
100-Year Flood Boundary	ZONE B
500-Year Flood Boundary	
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7x
Zone D Boundary	
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

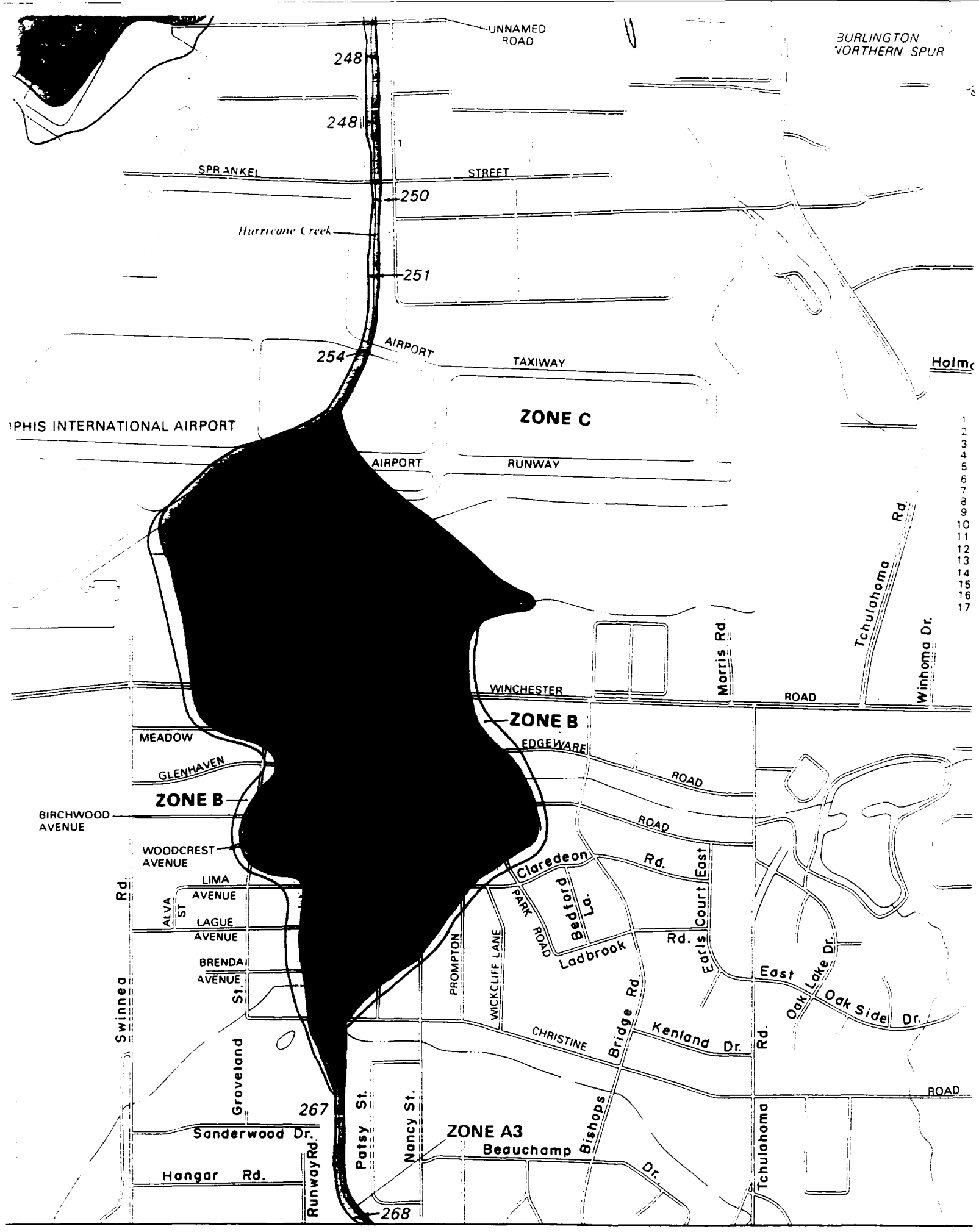
For adjoining map panels, see separately printed Map Index.

INITIAL IDENTIFICATION:

AUGUST 23, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FEBRUARY 9, 1979


UNNAMED ROAD
BURLINGTON NORTHERN SPUR
248
248
SPRANKEL STREET
250
Hurricane Creek
251
AIRPORT TAXIWAY
254
PHIS INTERNATIONAL AIRPORT
ZONE C
AIRPORT RUNWAY
Holmes
Tchulahoma Rd.
Morris Rd.
Winhoma Dr.
WINCHESTER ROAD
ZONE B
MEADOW
EDGEWARE ROAD
GLENHAVEN
ZONE B
BIRCHWOOD AVENUE
ROAD
WOODCREST AVENUE
Claredeon Rd.
East
LIMA AVENUE
ALVA ST
LAGUE AVENUE
PARK ROAD
Bedford La.
Ladbrook Rd.
Earls Court
BRENDA AVENUE
St.
PROMPTON
WICKCLIFF LANE
Bridge Rd.
East Oak Lake Dr.
Oak Side Dr.
Swinnea Rd.
CHRISTINE
Kenland Dr.
Rd.
ROAD
Groveland
267
Sanderwood Dr.
Patsy St.
Nancy St.
ZONE A3
Beauchamp Bishops Dr.
Tchulahoma
Hangar Rd.
Runway Rd.
268

REFERENCE 23

21
22

B&V WASTE SCIENCE AND TECHNOLOGY CORP.

TELEPHONE MEMORANDUM

BVWST Project 52012.003
December 23, 1991
12:50 p.m.

Recreational Fishing

To: John Condor, Wildlife Manager
Company: Wildlife Resources Agency
Phone No.: (901) 423-5725

Recorded by: Laura Morrisson JM 12-23-91

There has been a commercial fishing ban on the Mississippi River and connecting streams from Tipton County to the Mississippi state line since 1985. Periodic fish sampling has shown chlordane in fish in the Mississippi River. There are warnings posted about eating the fish from the Mississippi River. Recreational fishing occurs despite these warnings.

Arkansas has never participated in the fishing bans on the Mississippi River, even though they are aware of the potential hazards.

/ms

REFERENCE 24

B&V WASTE SCIENCE AND TECHNOLOGY CORP.

TELEPHONE MEMORANDUM

US EPA Site Assessment — BVWST Project 52012.xxx
Memphis, Tennessee SIPs — BVWST File
Fishing and Recreation on Memphis area water bodies — July 1, 1992
9:15 a.m.

To: John Rayfield
Company: TN Wildlife Resource Agency, Shelby County office
Phone No.: (901) 753-1351

Recorded by: Paul Delphos PD 6-1-92

The following water bodies are the only Memphis area rivers which are monitored and/or evaluated by the TN Wildlife Resource Agency. All other creeks are not considered large enough to be monitored. These water bodies include:

Mississippi River
Loosahatchie River
Nonconnah Creek
Wolf River
Lake McKellar

There is a commercial fishing ban for all these water bodies, and it is recommended for recreational fishing that "no consumption of fish" occurs with fish caught from these rivers. This statement is made in the area's fishing guide and Mr. Rayfield only knows of signs posted on Lake McKellar as it is the most utilized water body in the area. He verified that recreational fishing occurs on the above mentioned rivers and caught fish are carried away, therefore, Mr. Rayfield assumes the fish are eaten. He also stated that boating, water skiing, and swimming occur on the above mentioned water bodies, with Lake McKellar being used the most and the Mississippi River being used the least.r

B&V WASTE SCIENCE AND TECHNOLOGY CORP.

TELEPHONE MEMORANDUM

FIT

BVWST Project 52012.003
BVWST File
February 11, 1992

To: Ron Garovelli, Chief of Fisheries
Company: Mississippi Wildlife and Fisheries
Phone No.: (601) 362-9212

Recorded by: Laura Morrisson LM 2-11-92

The state of Mississippi has never had a fishing ban, recreational or commercial, on the Mississippi River.

ms

REFERENCE 26

i

Memphis Airport Storage
LATITUDE 35: 3: 6 LONGITUDE 89:58:26 1980 POPULATION

KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	0	0	0	4419	7805	16171	28485
S 2	0	0	0	0	6803	14212	21015
S 3	0	0	1951	1248	0	15465	18664
S 4	0	526	0	5432	0	0	5958
S 5	0	0	0	0	0	5443	5443
S 6	0	0	98	3710	9134	10304	23252
S 7	0	0	0	8686	7118	5704	21508
S 8	0	0	0	0	5992	10777	16769
RING TOTALS	0	526	2049	23501	36942	78076	141094

press RETURN to continue
MENU: Geodata Handling Data List procedures
Enter[illegible]name (in parentheses) ([illegible])
or a command: HELP, HELP option, BACK, CLEAR, EXIT, TUTOR
GEMS> exit

Type YES to confirm the EXIT command; type NO to restart GEMS
GEMS> yes
$ logout
HTW logged out at 22-FEB-1993 08:46:41.18
Itemized resource charges, for this session, follow:

NODE: VAXTM1
ACCT: 9040
PROJ: GEMS0001
USER: HTW
UIC: [000710,000012]
BAUD:

START TIME: 22-FEB-1993 08:44:41.33
FINISH TIME: 22-FEB-1993 08:46:41.18
BILLING PERIOD: 930201
WEEKDAY: MONDAY
TERMINAL PORT: VTA1878

DESCRIPTION OF CHARGE		QUANTITY	EXPENDITURE
ALL CHARGE LEVELS			
300 baud	(Seconds)	120	0.0000
CPU TIME	(Seconds)	2	0.4656
TOTAL FOR THIS SESSION			$ 0.4656

** Note: This total reflects the charges for this process only, subprocesses created during this session are accounted for separately
Enter selection:

OMB Approval Number: 2050-0095
Approved for Use Through: 4/95

PA-Score

PA ScoreSheets

Site Name: MEMPHIS AIRPORT STORAGE AREA
CERCLIS ID No.: TND980728034
Street Address: CORNER OF WINCHESTER AND SWINNEA
City/State/Zip: MEMPHIS, TN 38138

Investigator: R. FRANKLIN
Agency/Organization: HALLIBURTON NUS
Street Address: 2075 E WEST PARK PLACE BLVD
City/State: STONE MOUNTAIN, GA

Date: 03-01-93

WASTE CHARACTERISTICS

Waste Characteristics (WC) Calculations:

1 CONTAMINATED SOIL Contaminated soil Ref: 1 WQ value maximum

Area 5.00E-01 acres 6.41E-01 6.41E-01
THE ONLY SOURCE IDENTIFIED ON THE SITE IS CONTAMINATED SOIL RESULTING FROM PAST SPILLS. THE TOTAL SITE AREA IS APPROXIMATELY 0.5 ACRE, WHICH IS THE MAXIMUM POSSIBLE SOURCE AREA SIZE. THERE HAVE BEEN NO SOURCE SAMPLES COLLECTED AT THE SITE.
Ref: 1

** Only First WC Page Is Printed ** | Waste Characteristics Score: WC = 18

Ground Water Pathway Criteria List Suspected Release	
Are sources poorly contained? (y/n/u)	Y
Is the source a type likely to contribute to ground water contamination (e.g., wet lagoon)? (y/n/u)	N
Is waste quantity particularly large? (y/n/u)	N
Is precipitation heavy? (y/n/u)	N
Is the infiltration rate high? (y/n/u)	N
Is the site located in an area of karst terrain? (y/n)	N
Is the subsurface highly permeable or conductive? (y/n/u)	N
Is drinking water drawn from a shallow aquifer? (y/n/u)	N
Are suspected contaminants highly mobile in ground water? (y/n/u)	Y
Does analytical or circumstantial evidence suggest ground water contamination? (y/n/u)	N
Other criteria? (y/n)	N
SUSPECTED RELEASE? (y/n)	N

Summarize the rationale for Suspected Release:

Ground Water Pathway Criteria List
Primary Targets

Is any drinking water well nearby? (y/n/u)

Has any nearby drinking water well been closed? (y/n/u)

Has any nearby drinking water well user reported foul-testing or foul-smelling water? (y/n/u)

Does any nearby well have a large drawdown/high production rate? (y/n/u)

Is any drinking water well located between the site and other wells that are suspected to be exposed to a hazardous substance? (y/n/u)

Does analytical or circumstantial evidence suggest contamination at a drinking water well? (y/n/u)

Does any drinking water well warrant sampling? (y/n/u)

Other criteria? (y/n)

PRIMARY TARGET(S) IDENTIFIED? (y/n)

Summarize the rationale for Primary Targets:

GROUND WATER PATHWAY SCORESHEETS

Pathway Characteristics

		Ref.
Do you suspect a release? (y/n)	No	
Is the site located in karst terrain? (y/n)	No	6
Depth to aquifer (feet):	30	6
Distance to the nearest drinking water well (feet):	16368	2,13

LIKELIHOOD OF RELEASE	Suspected Release	No Suspected Release	References
1. SUSPECTED RELEASE	0		
2. NO SUSPECTED RELEASE		500	
LR =	0	500	

Targets

TARGETS	Suspected Release	No Suspected Release	References
3. PRIMARY TARGET POPULATION 0 person(s)	0		
4. SECONDARY TARGET POPULATION Are any wells part of a blended system? (y/n) Y	0	417	
5. NEAREST WELL	0	2	
6. WELLHEAD PROTECTION AREA None within 4 Miles	0	0	
7. RESOURCES	0	5	
T =	0	424	

WASTE CHARACTERISTICS

WC =	0	18

GROUND WATER PATHWAY SCORE:	46

Ground Water Target Populations

Primary Target Population Drinking Water Well ID	Dist. (miles)	Population Served	Reference	Value
None				
*** Note : Maximum of 5 Wells Are Printed ***			Total	

Secondary Target Population Distance Categories	Population Served	Reference	Value
0 to 1/4 mile	0		0
Greater than 1/4 to 1/2 mile	0		0
Greater than 1/2 to 1 mile	0		0
Greater than 1 to 2 miles	0		0
Greater than 2 to 3 miles	0		0
Greater than 3 to 4 miles	40812	2,13	417
		Total	417

Apportionment Documentation for a Blended System

MLGW SYSTEM: 206,652 CONNECTIONS X 2.65 PERSONS PER HOUSEHOLD (FROM US CENSUS DATA)= 547,628 POPULATION SERVED BY THE ENTIRE SYSTEM.

547,628 % 161 WELLS IN THE ENTIRE SYSTEM = 3,401 PERSONS SERVED PER WELL.

3-4 MILE RADIUS: 12 ALLEN WELLFIELD WELLS
12 WELLS X 3,401 PERSONS PER WELL = 40,812 POPULATION SERVED BY GROUNDWATER WELLS WITHIN 4 MILES OF THE SITE.

Ref: 2,12,13

Surface Water Pathway Criteria List Suspected Release	
Is surface water nearby? (y/n/u)	N
Is waste quantity particularly large? (y/n/u)	N
Is the drainage area large? (y/n/u)	N
Is rainfall heavy? (y/n/u)	N
Is the infiltration rate low? (y/n/u)	N
Are sources poorly contained or prone to runoff or flooding? (y/n/u)	Y
Is a runoff route well defined(e.g.ditch/channel to surf.water)? (y/n/u)	N
Is vegetation stressed along the probable runoff path? (y/n/u)	U
Are sediments or water unnaturally discolored? (y/n/u)	N
Is wildlife unnaturally absent? (y/n/u)	U
Has deposition of waste into surface water been observed? (y/n/u)	N
Is ground water discharge to surface water likely? (y/n/u)	N
Does analytical/circumstantial evidence suggest S.W. contam? (y/n/u)	N
Other criteria? (y/n) N	
SUSPECTED RELEASE? (y/n)	N

Summarize the rationale for Suspected Release:

Surface Water Pathway Criteria List
Primary Targets

Is any target nearby? (y/n/u) If yes: N
- N Drinking water intake
- N Fishery
- N Sensitive environment

Has any intake, fishery, or recreational area been closed? (y/n/u) N

Does analytical or circumstantial evidence suggest surface water contamination at or downstream of a target? (y/n/u) N

Does any target warrant sampling? (y/n/u) If yes: N
- N Drinking water intake
- N Fishery
- N Sensitive environment

Other criteria? (y/n) N

PRIMARY INTAKE(S) IDENTIFIED? (y/n) N

Summarize the rationale for Primary Intakes:

continued -------

continued -------

Other criteria? (y/n) N

PRIMARY FISHERY(IES) IDENTIFIED? (y/n) N

Summarize the rationale for Primary Fisheries:

Other criteria? (y/n) N

PRIMARY SENSITIVE ENVIRONMENT(S) IDENTIFIED? (y/n) N

Summarize the rationale for Primary Sensitive Environments:

SURFACE WATER PATHWAY SCORESHEETS

Pathway Characteristics		Ref.
Do you suspect a release? (y/n)	No	
Distance to surface water (feet):	2500	1
Flood frequency (years):	>500	19
What is the downstream distance (miles) to:		
a. the nearest drinking water intake?	N.A.	17,18
b. the nearest fishery?	2.0	23
c. the nearest sensitive environment?	2.0	20

LIKELIHOOD OF RELEASE	Suspected Release	No Suspected Release	References
1. SUSPECTED RELEASE	0		
2. NO SUSPECTED RELEASE		500	
LR =	0	500	

Drinking Water Threat Targets

TARGETS	Suspected Release	No Suspected Release	References
3. Determine the water body type, flow (if applicable), and number of people served by each drinking water intake.			
4. PRIMARY TARGET POPULATION 0 person(s)	0		
5. SECONDARY TARGET POPULATION Are any intakes part of a blended system? (y/n): N	0	0	
6. NEAREST INTAKE	0	0	
7. RESOURCES	0	5	
T =	0	5	

Drinking Water Threat Target Populations

Intake Name	Primary (y/n)	Water Body Type/Flow	Population Served	Ref.	Value
None					

Total Primary Target Population Value 0
Total Secondary Target Population Value 0

*** Note : Maximum of 6 Intakes Are Printed ***

Apportionment Documentation for a Blended System

Human Food Chain Threat Targets

TARGETS	Suspected Release	No Suspected Release	References
8. Determine the water body type and flow for each fishery within the target limit.			
9. PRIMARY FISHERIES	0		
10. SECONDARY FISHERIES	0	12	
T =	0	12	

Human Food Chain Threat Targets

Fishery Name	Primary (y/n)	Water Body Type/Flow	Ref.	Value
1 NONCONNAH CREEK	N	>100-1000 cfs	23	12
2 LAKE MCKELLAR	N	>100-1000 cfs	23	12
3 MISSISSIPPI RIVER	N	>10000 cfs	23	12

Total Primary Fisheries Value 0
Total Secondary Fisheries Value 0

*** Note : Maximum of 6 Fisheries Are Printed ***

Environmental Threat Targets

TARGETS	Suspected Release	No Suspected Release	References
11. Determine the water body type and flow (if applicable) for each sensitive environment.			
12. PRIMARY SENSITIVE ENVIRONMENTS	0		
13. SECONDARY SENSITIVE ENVIRONS.	0	10	
T =	0	10	

Environmental Threat Targets

Sensitive Environment Name	Primary (y/n)	Water Body Type/Flow	Ref.	Value
1 wetlands	N	>100-1000 cfs	20	0

Total Primary Sensitive Environments Value 0
Total Secondary Sensitive Environments Value 0

*** Note: Maximum of 6 Sensitive Environments Are Printed ***

Surface Water Pathway Threat Scores

Threat	Likelihood of Release(LR) Score	Targets(T) Score	Pathway Waste Characteristics (WC) Score	Threat Score LR x T x WC / 82,500
Drinking Water	500	5	18	1
Human Food Chain	500	12	18	1
Environmental	500	10	18	1

SURFACE WATER PATHWAY SCORE: 3

Soil Exposure Pathway Criteria List
Resident Population

Is any residence, school, or daycare facility on or within 200 feet of an area of suspected contamination? (y/n/u)	N
Is any residence, school, or daycare facility located on adjacent land previously owned or leased by the site owner/operator? (y/n/u)	N
Is there a migration route that might spread hazardous substances near residences, schools, or daycare facilities? (y/n/u)	N
Have onsite or adjacent residents or students reported adverse health effects, exclusive of apparent drinking water or air contamination problems? (y/n/u)	N
Does any neighboring property warrant sampling? (y/n/u)	N

Other criteria? (y/n) N

RESIDENT POPULATION IDENTIFIED? (y/n) N

Summarize the rationale for Resident Population:

SOIL EXPOSURE PATHWAY SCORESHEETS

Pathway Characteristics		Ref.
Do any people live on or within 200 ft of areas of suspected contamination? (y/n)	No	5
Do any people attend school or daycare on or within 200 ft of areas of suspected contamination? (y/n)	No	5
Is the facility active? (y/n):	Yes	5

LIKELIHOOD OF EXPOSURE	Suspected Contamination	References
1. SUSPECTED CONTAMINATION LE =	550	

Targets

2. RESIDENT POPULATION 0 resident(s) 0 school/daycare student(s)	0	5 5
3. RESIDENT INDIVIDUAL	0	
4. WORKERS 1 - 100	5	5
5. TERRES. SENSITIVE ENVIRONMENTS	0	
6. RESOURCES	5	
T =	10	

WASTE CHARACTERISTICS

WC = 18

RESIDENT POPULATION THREAT SCORE: 1

NEARBY POPULATION THREAT SCORE: 2

Population Within 1 Mile: 10,001 - 50,000

SOIL EXPOSURE PATHWAY SCORE: 3

Soil Exposure Pathway Terrestrial Sensitive Environments

Terrestrial Sensitive Environment Name	Reference	Value
None		
Total Terrestrial Sensitive Environments Value		

*** Note : Maximum of 7 Sensitive Environments Are Printed ***

Air Pathway Criteria List
Suspected Release

Are odors currently reported? (y/n/u)	N
Has release of a hazardous substance to the air been directly observed? (y/n/u)	N
Are there reports of adverse health effects (e.g., headaches, nausea, dizziness) potentially resulting from migration of hazardous substances through the air? (y/n/u)	N
Does analytical/circumstantial evidence suggest release to air? (y/n/u)	N
Other criteria? (y/n) N	
SUSPECTED RELEASE? (y/n)	N

Summarize the rationale for Suspected Release:

AIR PATHWAY SCORESHEETS

Pathway Characteristics

		Ref.
Do you suspect a release? (y/n)	No	
Distance to the nearest individual (feet):	500	5

LIKELIHOOD OF RELEASE	Suspected Release	No Suspected Release	References
1. SUSPECTED RELEASE	0		
2. NO SUSPECTED RELEASE		500	
LR =	0	500	

Targets

TARGETS	Suspected Release	No Suspected Release	References
3. PRIMARY TARGET POPULATION 0 person(s)	0		
4. SECONDARY TARGET POPULATION	0	34	
5. NEAREST INDIVIDUAL	0	20	
6. PRIMARY SENSITIVE ENVIRONS.	0		
7. SECONDARY SENSITIVE ENVIRONS.	0	0	
8. RESOURCES	0	5	
T =	0	59	

WASTE CHARACTERISTICS

WC =	0	18

AIR PATHWAY SCORE:	6

Air Pathway Secondary Target Populations

Distance Categories	Population	References	Value
Onsite	5	5	1
Greater than 0 to 1/4 mile	0	26	0
Greater than 1/4 to 1/2 mile	526	26	3
Greater than 1/2 to 1 mile	2049	26	3
Greater than 1 to 2 miles	23507	26	8
Greater than 2 to 3 miles	36942	26	12
Greater than 3 to 4 miles	78076	26	7
	Total Secondary Population Value		34

Air Pathway Primary Sensitive Environments

Sensitive Environment Name	Reference	Value
None		
Total Primary Sensitive Environments Value		

*** Note : Maximum of 7 Sensitive Environments Are Printed***

Air Pathway Secondary Sensitive Environments

Sensitive Environment Name	Distance	Reference	Value
None			
Total Secondary Sensitive Environments Value			

SITE SCORE CALCULATION	SCORE
GROUND WATER PATHWAY SCORE:	46
SURFACE WATER PATHWAY SCORE:	3
SOIL EXPOSURE PATHWAY SCORE:	3
AIR PATHWAY SCORE:	6
SITE SCORE:	23

SUMMARY

1. Is there a high possibility of a threat to any nearby drinking water well(s) by migration of a hazardous substance in ground water? No

   If yes, identify the well(s).

   If yes, how many people are served by the threatened well(s)? 0

2. Is there a high possibility of a threat to any of the following by hazardous substance migration in surface water?
   - A. Drinking water intake — No
   - B. Fishery — No
   - C. Sensitive environment (wetland, critical habitat, others) — No

   If yes, identity the target(s).

3. Is there a high possibility of an area of surficial contamination within 200 feet of any residence, school, or daycare facility? No

   If yes, identify the properties and estimate the associated population(s)

4. Are there public health concerns at this site that are not addressed by PA scoring considerations? No

   If yes, explain:

REFERENCE LIST

OMB Approval Number: 2050-0095
Approved for Use Through: 4/95

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: TN	CERCLIS Number: TND980728034
	CERCLIS Discovery Date: 08-19-80	

1. General Site Information

Name:			Street Address:		
MEMPHIS AIRPORT STORAGE AREA			CORNER OF WINCHESTER AND SWINNEA		
City:	State:	Zip Code:	County:	Co. Code:	Cong. Dist:
MEMPHIS	TN	38138	SHELBY	157	08
Latitude: Longitude:	Approx. Area of Site:		Status of Site:		
35° 3' 6.0" 89° 58' 26.0"	1 acres		Active		

2. Owner/Operator Information

Owner:			Operator:		
SHELBY COUNTY AIRPORT AUTHORITY			SAME		
Street Address:			Street Address:		
P.O. BOX 30168					
City:			City:		
MEMPHIS					
State:	Zip Code:	Telephone:	State:	Zip Code:	Telephone:
TN	38130	(901) 922-8000			
Type of Ownership:			How Initially Identified:		
Municipal			Federal Program		

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: TN	CERCLIS Number: TND980728034
	CERCLIS Discovery Date: 08-19-80	

3. Site Evaluator Information

Name of Evaluator:	Agency/Organization:	Date Prepared:
R. FRANKLIN	HALLIBURTON NUS	03-01-93

Street Address:	City:	State:
2075 E WEST PARK PLACE BLVD	STONE MOUNTAIN	GA

Name of EPA or State Agency Contact:	Telephone:
DAVID WILLIAMS EPA REGION IV	(404) 347-5065

Street Address:	City:	State:
345 COURTLAND STREET N.E.	ATLANTA	GA

4. Site Disposition (for EPA use only)

Emergency Response/Removal Assessment Recommendation: No	CERCLIS Recommendation: NFRAP	Signature:
Date:	Date:	Name:
		Position:

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: TN	CERCLIS Number: TND980728034
	CERCLIS Discovery Date: 08-19-80	

5. General Site Characteristics

Predominant Land Uses Within 1 Mile of Site:	Site Setting:	Years of Operation:
Industrial Commercial Residential	Urban	Beginning Year: 0 Ending Year: 0 X Unknown

Type of Site Operations:	Waste Generated:
Junk/Salvage Yard	Onsite
	Waste Deposition Authorized By: Present Owner
	Waste Accessible to the Public: No
	Distance to Nearest Dwelling, School, or Workplace: 500 Feet

6. Waste Characteristics Information

Source Type	Quantity	Tier
Contaminated soil	5.00e-01 acres	A

General Types of Waste:
- Solvents
- Construction/Demolition Waste
- Oily Waste

Physical State of Waste as Deposited:
- Solid
- Liquid

Tier Legend
C = Constituent W = Wastestream
V = Volume A = Area

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: TN	CERCLIS Number: TND980728034
	CERCLIS Discovery Date: 08-19-80	

7. Ground Water Pathway

Is Ground Water Used for Drinking Water Within 4 Miles: No Type of Ground Water Wells Within 4 Miles: Municipal	Is There a Suspected Release to Ground Water: No Have Primary Target Drinking Water Wells Been Identified: No	List Secondary Target Population Served by Ground Water Withdrawn From: 0 - 1/4 Mile 0 >1/4 - 1/2 Mile 0 >1/2 - 1 Mile 0 >1 - 2 Miles 0 >2 - 3 Miles 0 >3 - 4 Miles 40812 Total 40812
Depth to Shallowest Aquifer: 30 Feet Karst Terrain/Aquifer Present: No	Nearest Designated Wellhead Protection Area: None within 4 Miles	

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: TN	CERCLIS Number: TND980728034
	CERCLIS Discovery Date: 08-19-80	

8. Surface Water Pathway — Part 1 of 4

Type of Surface Water Draining Site and 15 Miles Downstream:	Shortest Overland Distance From Any Source to Surface Water:
Stream River	2500 Feet 0.5 Miles
Is there a Suspected Release to Surface Water: No	Site is Located in: > 500 yr floodplain

8. Surface Water Pathway — Part 2 of 4

Drinking Water Intakes Along the Surface Water Migration Path: No

Have Primary Target Drinking Water Intakes Been Identified: No

Secondary Target Drinking Water Intakes:
None

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: TN	CERCLIS Number: TND980728034
	CERCLIS Discovery Date: 08-19-80	

8. Surface Water Pathway Part 3 of 4

Fisheries Located Along the Surface Water Migration Path: Yes

Have Primary Target Fisheries Been Identified: No

Secondary Target Fisheries:

Fishery Name	Water Body Type/Flow(cfs)
NONCONNAH CREEK	moderate-large stream/ >100-1000
LAKE MCKELLAR	moderate-large stream/ >100-1000
MISSISSIPPI RIVER	large river/ >10000

8. Surface Water Pathway Part 4 of 4

Wetlands Located Along the Surface Water Migration Path? (y/n) Yes

Have Primary Target Wetlands Been Identified? (y/n) No

Secondary Target Wetlands:

Water Body/Flow(cfs)	Frontage(mi)
moderate-large stream/ >100-1000	>8 to 12

Other Sensitive Environments Along the Surface Water Migration Path: No

Have Primary Target Sensitive Environments Been Identified: No

Secondary Target Sensitive Environments:
None

POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT FORM	IDENTIFICATION	
	State: TN	CERCLIS Number: TND980728034
	CERCLIS Discovery Date: 08-19-80	

9. Soil Exposure Pathway

Are People Occupying Residences or Attending School or Daycare on or Within 200 Feet of Areas of Known or Suspected Contamination: No	Number of Workers Onsite: 1 - 100

Have Terrestrial Sensitive Environments Been Identified on or Within 200 Feet of Areas of Known or Suspected Contamination: No

10. Air Pathway

Total Population on or Within:	
Onsite	5
0 - 1/4 Mile	0
>1/4 - 1/2 Mile	526
>1/2 - 1 Mile	2049
>1 - 2 Miles	23507
>2 - 3 Miles	36942
>3 - 4 Miles	78076
Total	141105

Is There a Suspected Release to Air: No

Wetlands Located Within 4 Miles of the Site: No

Other Sensitive Environments Located Within 4 Miles of the Site: No

Sensitive Environments Within 1/2 Mile of the Site:
None

N/F

REGION: 04
STATE : TN

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF EMERGENCY AND REMEDIAL RESPONSE
C E R C L I S V 1.2

699
RUN DATE: 02/03/87
RUN TIME: 13:53:24

M.2 - SITE MAINTENANCE FORM

EPA ID : TND980728034

SITE NAME: MEMPHIS ARPT STORAGE AREA-SEL-9 SOURCE: S

STREET : WINCHESTER CONG DIST: 08

CITY : MEMPHIS ZIP: 38138

CNTY NAME: SHELBY CNTY CODE : 157

LATITUDE : 35/03/04.0 LONGITUDE : 089/58/26.0

LL-SOURCE: R LL-ACCURACY:

SMSA : 4920 HYDRO UNIT: 08010210

INVENTORY IND: Y REMEDIAL IND: Y REMOVAL IND: N FED FAC IND: N

NPL IND: N NPL LISTING DATE: NPL DELISTING DATE:

SITE/SPILL IDS:

RPM NAME: RPM PHONE: - -

SITE CLASSIFICATION: SITE APPROACH:

DIOXIN TIER: REG FLD1: REG FLD2:

RESP TERM: PENDING ( ) NO FURTHER ACTION ( )

ENF DISP: NO VIABLE RESP PARTY ( ) VOLUNTARY RESPONSE ( )
ENFORCED RESPONSE ( ) COST RECOVERY ( )

SITE DESCRIPTION:

* ACTION: _

* _____ _ *

* _____ __ *

* _____ _____-____ *

* _____ ___ *

* __/__/__._ ___/__/__._ *

* _ _ *

* ____ _____ *

* _ _ _ _ *

* _ __/__ __/__ *

* __ __ __ __ __ *

* _____ ___-___-____ *

* __ ____ *

* _____ _____ _ *

* PENDING (_) NO FURTHER ACTION (_) *

* _ _ *
* _ _ *

* _____ *

* _____ *

* _____ *

* _____ *

REGION: 04
STATE : TN

U.S. ENVIRONMEI / PROTECTION AGENCY
OFFICE OF EMERGENCY AND REMEDIAL RESPONSE
C E R C L I S V 1.2

PAGE: 700
RUN DATE: 02/03/87
RUN TIME: 13:53:24

M.2 - PROGRAM MAINTENANCE FORM

* ACTION: _ *

SITE: MEMPHIS ARPT STORAGE AREA-SEL-9

EPA ID: TND980728034 PROGRAM CODE: H01 PROGRAM TYPE: * _ *

PROGRAM QUALIFIER: ALIAS LINK : * ___ __ *

PROGRAM NAME: SITE EVALUATION * _____ *

DESCRIPTION:

* _____ *

* _____ *

* _____ *

* _____ *

REGION: 04
STATE : TN

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF EMERGENCY AND REMEDIAL RESPONSE
C E R C L I S V 1.2

PAGE: 701
RUN DATE: 02/03/87
RUN TIME: 13:53:24

M.2 - EVENT MAINTENANCE FORM

* ACTION: _ *

SITE: MEMPHIS ARPT STORAGE AREA-SEL-9
PROGRAM: SITE EVALUATION

EPA ID: TND980728034 PROGRAM CODE: H01 EVENT TYPE: DS1

FMS CODE: EVENT QUALIFIER : EVENT LEAD: E * _ ___ _ *

EVENT NAME: DISCOVERY STATUS: * _____ _ *

DESCRIPTION:

* _____ *
* _____ *
* _____ *
* _____ *

	ORIGINAL	CURRENT	ACTUAL			
START:		START:	START:	* __/__/__	__/__/__	__/__/__ *
COMP :		COMP :	COMP : 12/01/79	* __/__/__	__/__/__	__/__/__ *

HQ COMMENT:

* _____ *

RG COMMENT:

* _____ *

COOP AGR #	AMENDMENT #	STATUS	STATE %				
			0	* _____	_____	_	___ *

REGION: 04
STATE : TN

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF EMERGENCY AND REMEDIAL RESPONSE
C E R C L I S V 1.2

RUN DATE: 02/03/87
RUN TIME: 13:53:24

M.2 - EVENT MAINTENANCE FORM

* ACTION: _ *

SITE: MEMPHIS ARPT STORAGE AREA-SEL-9
PROGRAM: SITE EVALUATION

EPA ID: TND980728034 PROGRAM CODE: H01 EVENT TYPE: PA1

FMS CODE: EVENT QUALIFIER : EVENT LEAD: S * _ ___ _ *

EVENT NAME: PRELIMINARY ASSESSMENT STATUS: * _____ _ *

DESCRIPTION:

* _____ *
* _____ *
* _____ *
* _____ *

ORIGINAL	CURRENT	ACTUAL			
START:	START:	START: 01/01/84	* __/__/__	__/__/__	__/__/__ *
COMP :	COMP :	COMP : 08/01/84	* __/__/__	__/__/__	__/__/__ *

HQ COMMENT:

* _____ *

RG COMMENT:

* _____ *

COOP AGR #	AMENDMENT #	STATUS	STATE %				
			0	* _____	_____	__	___ *

REGION: 04
STATE : TN

U.S. ENVIRONMEN PROTECTION AGENCY
OFFICE OF EMERGENCY AND REMEDIAL RESPONSE
C E R C L I S V 1.2

PAGE : 703
RUN DATE: 02/03/87
RUN TIME: 13:53:24

M.2 - EVENT MAINTENANCE FORM

* ACTION: _ *

SITE: MEMPHIS ARPT STORAGE AREA-SEL-9
PROGRAM: SITE EVALUATION

EPA ID: TND980728034 PROGRAM CODE: H01 EVENT TYPE: SI1

FMS CODE: EVENT QUALIFIER : EVENT LEAD: E * _ ___ _ *

EVENT NAME: SITE INSPECTION STATUS: * _____ _ *

DESCRIPTION:

* _____ *
* _____ *
* _____ *
* _____ *

ORIGINAL	CURRENT	ACTUAL			
START:	START:	START: 08/01/80	* __/__/__	__/__/__	__/__/__ *
COMP :	COMP :	COMP : 08/01/84	* __/__/__	__/__/__	__/__/__ *

HQ COMMENT:

* _____ *

RG COMMENT:

* _____ *

COOP AGR #	AMENDMENT #	STATUS	STATE %				
			0	* _____	_____	__	___ *

REGION: 04
STATE : TN

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF EMERGENCY AND REMEDIAL RESPONSE
C E R C L I S V 1.2

PAGE: 704
RUN DATE: 02/03/87
RUN TIME: 13:53:24

M.2 - EVENT MAINTENANCE FORM

* ACTION: _ *

SITE: MEMPHIS ARPT STORAGE AREA-SEL-9
PROGRAM: SITE EVALUATION

EPA ID: TND980728034 PROGRAM CODE: H01 EVENT TYPE: SI2

FMS CODE: EVENT QUALIFIER : EVENT LEAD: S * _ ___ _ *

EVENT NAME: SITE INSPECTION STATUS: * _____ _ *

DESCRIPTION:

* _____ *
* _____ *
* _____ *
* _____ *

ORIGINAL	CURRENT	ACTUAL			
START:	START:	START: 08/01/80	__/__/__	__/__/__	__/__/__
COMP :	COMP :	COMP : 08/01/84	__/__/__	__/__/__	__/__/__

HQ COMMENT:

* _____ *

RG COMMENT:

* _____ *

COOP AGR #	AMENDMENT #	STATUS	STATE %				
			0	_____	_____	__	___

M.2 - COMMENT MAINTENANCE FORM

SITE: MEMPHIS ARPT STORAGE AREA-SEL-9

EPA ID: TND980728034

COM NO	COMMENT	ACTION	
001	STORAGE AREA FOR VARIOUS ITEMS USED IN MAITENANCE ARPT FACILITIES	_	
002	IN THE 08/19/80 EPA S.I. REPORT SOM E SPILLAGE WAS NOTED. NOT USED	_	
003	FOR DISPOSAL. RUNWAY DEICERS, FUEL, TAR, ETC. CONTACT: CHUCK GRAVES	_	
004	AIRFIELD MALINT. SUPERVISOR, (901)3 45-7777.	_	

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

OFFICE CORRESPONDENCE

FROM	TO	DATE

DATE: *September 25, 1984*

TO: *The Files*

FROM: *W. Barry Brawley*

SUBJECT: *§3012 Program - Site Investigations*
Memphis Airport Storage Area SEL-9
Memphis, TN.
TND 980728034

MEMPHIS AIRPORT STORAGE AREA
SEL-9

On June 6,1984, Barry Brawley and Tom Golden of The Tennessee Department of Health and Environment, §3012 Program visited the Memphis Airport Storage Area, designated SEL-9 by the EPA's EPIC Survey. Mr. Chuck Graves, Air Field Maintenance Supervisor, allowed access to the site and answered questions.

The Memphis Airport Storage Area was identified by an aerial survey conducted by the EPA known as the EPIC survey. This site was disignated SEL-9. The site consists of an open field area adjacent to the airport's runways where various numbers of drums are stored. The drums contain substances used in the maintenance and upkeep of the runways. All drums are stored on pallets or directly on the ground. According to Mr. Graves, no land disposal has ever occurred at this site; however, very small amounts of ground stain were observed around the drums. Mr. Graves was advised to contact the Memphis Field Office of the Division of Solid Waste Management for current regulations regarding this situation.

FROM	DATE

TO

Based on the facts that this site is used only for storage of raw materials and no land disposal has occurred, there is NO FURTHER ACTION required by the §3012 Program.

WBB/tad

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

EPA

I. IDENTIFICATION
01 STATE: TN | 02 SITE NUMBER: TND980728034

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
Memphis Airport Storage Area SEL-9	Winchester Rd

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Memphis	TN	38138	Shelby	157	08

09 COORDINATES: LATITUDE 35 03 04 | LONGITUDE 89 58 26

10 TYPE OF OWNERSHIP (Check one): ☐ A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☒ E. MUNICIPAL ☐ F. OTHER ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION	02 SITE STATUS	03 YEARS OF OPERATION
6.6.84 (MONTH DAY YEAR)	☒ ACTIVE ☐ INACTIVE	BEGINNING YEAR ____ ENDING YEAR ____ ☒ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR (Name of firm)
☒ E. STATE ☐ F. STATE CONTRACTOR (Name of firm) ☐ G. OTHER (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
Barry Brawley	Geologist	TN Dept. of H&E	(615)741-6287
09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO.
Tom Golden	Engineer	TN Dept. of H&E	(615)741-6287
			( )
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
Chuck Graves	Maintenance Supervisor	Memphis Airport Auth.	(901)345-7777
			( )
			( )
			( )
			( )
			( )

NO FURTHER ACTION

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☒ PERMISSION ☐ WARRANT	9:20 am	Cloudy, 78°

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
Chuck Graves	Memphis Airport Authority	(901)345-7777

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
Barry Brawley	TN Dept. of H&E	Div. of SWM	615-741-6287	9.25.84 (MONTH DAY YEAR)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D980728034

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES *(Check all that apply)*

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- ☐ C. SLUDGE
- ☐ D. OTHER _____ *(Specify)*
- ☐ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE
(Measures of waste quantities must be independent)

TONS _____
CUBIC YARDS _____
NO. OF DRUMS _____

03 WASTE CHARACTERISTICS *(Check all that apply)*

- ☐ A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☐ D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ☐ H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES *(See Appendix for most frequently cited CAS Numbers)*

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION

V. FEEDSTOCKS *(See Appendix for CAS Numbers)*

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

EPA FORM 2070-13 (7-81)

N/A

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	TND980728034

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: _____ (Acres) 04 NARRATIVE DESCRIPTION

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

N/A

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D980728034

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include names(s) of species)

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills/Runoff/Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D980725034

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A. NPDES				
☐ B. UIC				
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☐ A. SURFACE IMPOUNDMENT		
☐ B. PILES		
☒ C. DRUMS, ABOVE GROUND	Varys	
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
☐ F. LANDFILL		
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ I. OTHER (Specify)		

04 TREATMENT (Check all that apply)

- ☐ A. INCENERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER (Specify)

06 OTHER

☒ A. BUILDINGS ON SITE

08 AREA OF SITE

0,5 (Acres)

07 COMMENTS

Above-grand storage of drums containing materials used in the maintenence and upkeep of runways

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☒ B. MODERATE ☐ C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

Drums on pallets or bare ground; some spillage. Mr. Graves was advised to check with Memphis Field office of Div. of Swm regarding current regulations pertaining to storage

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ☐ YES ☒ NO

02 COMMENTS

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

Site visit

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	TND980728934

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)

	SURFACE	WELL
COMMUNITY	A. ☐	B. ☒
NON-COMMUNITY	C. ☐	D. ☒

02 STATUS

ENDANGERED	AFFECTED	MONITORED
A. ☐	B. ☐	C. ☐
D. ☐	E. ☐	F. ☐

03 DISTANCE TO SITE

A. _____ (mi)

B. _____ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING ☒ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available) ☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available) ☐ D. NOT USED, UNUSABLE

02 POPULATION SERVED BY GROUND WATER _____

03 DISTANCE TO NEAREST DRINKING WATER WELL _____ (mi)

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
_____ (ft)	_____	_____ (ft)	_____ (gpd)	☐ YES ☒ NO

09 DESCRIPTION OF WELLS (Including useage, depth, and location relative to population and buildings)

10 RECHARGE AREA		11 DISCHARGE AREA	
☐ YES ☐ NO	COMMENTS	☐ YES ☒ NO	COMMENTS

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☒ A. RESERVOIR, RECREATION DRINKING WATER SOURCE ☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☐ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
None affected	☐	_____ (mi)
	☐	_____ (mi)
	☐	_____ (mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
A. _____ NO. OF PERSONS	B. _____ NO. OF PERSONS	C. _____ NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION

_____ (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE

_____

04 DISTANCE TO NEAREST OFF-SITE BUILDING

_____ (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE: TN | 02 SITE NUMBER: TND980725034

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. $10^{-6} - 10^{-8}$ cm/sec ☐ B. $10^{-4} - 10^{-6}$ cm/sec ☐ C. $10^{-4} - 10^{-3}$ cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one)

☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) ☐ B. RELATIVELY IMPERMEABLE ($10^{-4} - 10^{-6}$ cm/sec) ☐ C. RELATIVELY PERMEABLE ($10^{-2} - 10^{-4}$ cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH	
_____ (ft)	_____ (ft)	_____	

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
_____ (in)	_____ (in)	_____ %		_____ %

09 FLOOD POTENTIAL
SITE IS IN _____ YEAR FLOODPLAIN

10
☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE	OTHER
A. _____ (mi)	B. _____ (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)
_____ (mi)
ENDANGERED SPECIES: _____

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AG LAND
A. < 1 (mi)	B. ~ 2 (mi)	C. > 10 (mi)	D. _____ (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

Site is located within boundaries of Memphis Airport. Access to site is restricted by fences and guards. Storage area is located on a slight topographic rise adjacent to runways.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Site visit

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D980728034

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER		None taken	
SURFACE WATER			
WASTE			
AIR			
RUNOFF			
SPILL			
SOIL			
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☐ GROUND ☒ AERIAL

02 IN CUSTODY OF EPA - ERLC Survey
(Name of organization or individual)

03 MAPS ☐ YES ☐ NO

04 LOCATION OF MAPS

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D980728034

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER
Memphis Airport Authority			

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE
Winchester			

05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE
Memphis	TN	38138			

PARENT COMPANY (If applicable)

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE
05 CITY / 06 STATE	07 ZIP CODE	12 CITY / 13 STATE	14 ZIP CODE

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE
05 CITY / 06 STATE	07 ZIP CODE	12 CITY / 13 STATE	14 ZIP CODE

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE
05 CITY / 06 STATE	07 ZIP CODE	12 CITY / 13 STATE	14 ZIP CODE

III. PREVIOUS OWNER(S) (List most recent first)

IV. REALTY OWNER(S) (If applicable; list most recent first)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY / 06 STATE	07 ZIP CODE	05 CITY / 06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY / 06 STATE	07 ZIP CODE	05 CITY / 06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY / 06 STATE	07 ZIP CODE	05 CITY / 06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D980728034

II. CURRENT OPERATOR (Provide if different from owner)

01 NAME	02 D+B NUMBER
None	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER

OPERATOR'S PARENT COMPANY (If applicable)

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner)

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

PREVIOUS OPERATORS' PARENT COMPANIES (If applicable)

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

10 NAME	11 D+B NUMBER

12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

14 CITY	15 STATE	16 ZIP CODE

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	D980725034

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

N/A

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TNJ	D980728034

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ F. WASTE REPACKAGED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ H. ON SITE BURIAL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ L. ENCAPSULATION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ N. CUTOFF WALLS — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

N/A

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION
01 STATE: TN | 02 SITE NUMBER: TND980728034

II PAST RESPONSE ACTIVITIES *(Continued)*

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ S. CAPPING/COVERING — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ V. BOTTOM SEALED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ W. GAS CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ X. FIRE CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Y. LEACHATE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Z. AREA EVACUATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 2. POPULATION RELOCATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

III. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
TN	TND982728034

II. ENFORCEMENT INFORMATION

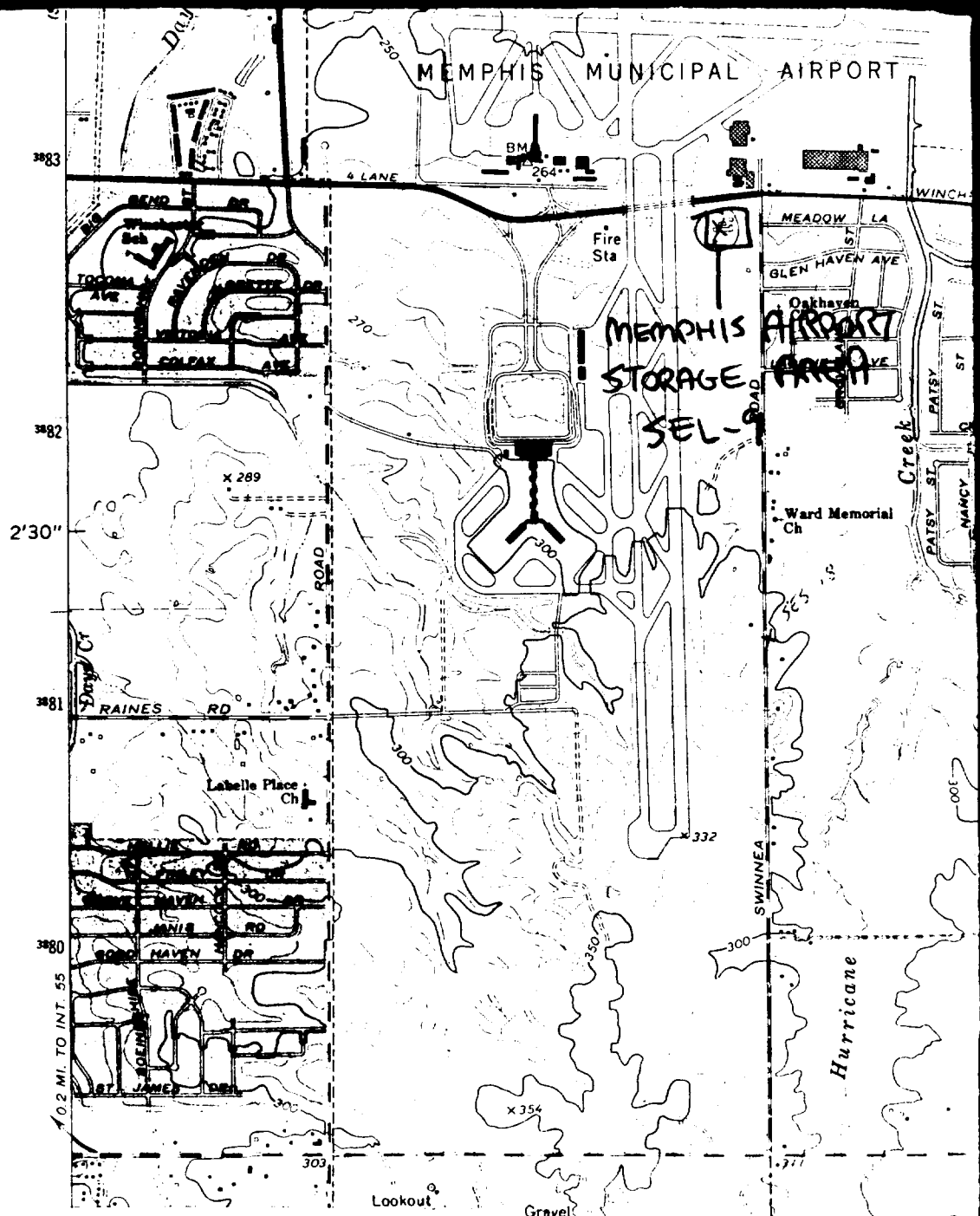
01 PAST REGULATORY/ENFORCEMENT ACTION ☐ YES ☒ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

None

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-13 (7-81)



SOUTHEAST MEMPHIS QUADRANGLE

TENNESSEE – SHELBY CO.

7.5 MINUTE SERIES (TOPOGRAPHIC)

SW 4 BARTLETT 15 QUADRANGLE

TND986728034 SEL-9

EPA POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT

REGION: 4 | SITE NUMBER (To be assigned by HQ):

GENERAL INSTRUCTIONS: Complete Sections I and III through XV of this form as completely as possible. Then use the information on this form to develop a Tentative Disposition (Section II). File this form in its entirety in the regional Hazardous Waste Log File. Be sure to include all appropriate Supplemental Reports in the file. Submit a copy of the forms to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Task Force (EN-335); 401 M St., SW; Washington, DC 20460.

I. SITE IDENTIFICATION

A. SITE NAME: ~~Memphis Airport~~ Memphis Airport Storage Area SEL-9

B. STREET (or other identifier): Winchester at Swinnea

C. CITY: Memphis

D. STATE: TN

E. ZIP CODE:

F. COUNTY NAME: Shelby

G. SITE OPERATOR INFORMATION

1. NAME: Memphis Airport Authority (Memphis International Airport)

2. TELEPHONE NUMBER: 901-345-7777

3. STREET:

4. CITY: Memphis

5. STATE: TN

6. ZIP CODE:

H. REALTY OWNER INFORMATION (If different from operator of site)

1. NAME:

2. TELEPHONE NUMBER:

3. CITY:

4. STATE:

5. ZIP CODE:

I. SITE DESCRIPTION: Construction materials, materials used in maintaince of runways. Run way De-Icer in Barrels Old fuel oil drums, most empty, Reels of Cable, storage area

J. TYPE OF OWNERSHIP

☐ 1. FEDERAL ☐ 2. STATE ☐ 3. COUNTY ☒ 4. MUNICIPAL ☐ 5. PRIVATE

II. TENTATIVE DISPOSITION (complete this section last)

A. ESTIMATE DATE OF TENTATIVE DISPOSITION (mo., day, & yr.):

B. APPARENT SERIOUSNESS OF PROBLEM

☐ 1. HIGH ☐ 2. MEDIUM ☐ 3. LOW ☒ 4. NONE

C. PREPARER INFORMATION

1. NAME: George R. Harvell

2. TELEPHONE NUMBER: 404-881-4901

3. DATE (mo., day, & yr.): 9/9/80

III. INSPECTION INFORMATION

A. PRINCIPAL INSPECTOR INFORMATION

1. NAME: George R. Harvell

2. TITLE: Environmental Engr.

3. ORGANIZATION: USEPA, Region IV

4. TELEPHONE NO. (area code & no.): 404-881-4901

B. INSPECTION PARTICIPANTS

1. NAME	2. ORGANIZATION	3. TELEPHONE NO.
George R. Harvell	USEPA	404-881-4901
Tom Runyan	" "	404-881-7428

C. SITE REPRESENTATIVES INTERVIEWED (corporate officials, workers, residents)

1. NAME	2. TITLE & TELEPHONE NO.	3. ADDRESS
Chuck Graves	Air Field Maint. Supv. 901-345-7777	
Dale Reeves	Chief of Security 901-345-7777	

Continued From Front

II. INSPECTION INFORMATION *(continued)*

D. GENERATOR INFORMATION *(sources of waste)*

1. NAME	2. TELEPHONE NO.	3. ADDRESS	4. WASTE TYPE GENERATED

E. TRANSPORTER/HAULER INFORMATION

1. NAME	2. TELEPHONE NO.	3. ADDRESS	4. WASTE TYPE TRANSPORTED

F. IF WASTE IS PROCESSED ON SITE AND ALSO SHIPPED TO OTHER SITES, IDENTIFY OFF-SITE FACILITIES USED FOR DISPOSAL.

1. NAME	2. TELEPHONE NO.	3. ADDRESS

G. DATE OF INSPECTION (mo., day, & yr.)	H. TIME OF INSPECTION	I. ACCESS GAINED BY: *(credentials must be shown in all cases)*
8/19/80	10:54 AM	☒ 1. PERMISSION ☐ 2. WARRANT

J. WEATHER *(describe)*
Sunny, Warm

IV. SAMPLING INFORMATION

A. Mark 'X' for the types of samples taken and indicate where they have been sent e.g., regional lab, other EPA lab, contractor, etc. and estimate when the results will be available.

1. SAMPLE TYPE	2. SAMPLE TAKEN (mark 'X')	3. SAMPLE SENT TO:	4. DATE RESULTS AVAILABLE
a. GROUNDWATER			
b. SURFACE WATER			
c. WASTE			
d. AIR			
e. RUNOFF			
f. SPILL			
g. SOIL			
h. VEGETATION			
i. OTHER (specify)			

B. FIELD MEASUREMENTS TAKEN *(e.g., radioactivity, explosivity, PH, etc.)*

1. TYPE	2. LOCATION OF MEASUREMENTS	3. RESULTS

Continued From Page 2

IV. SAMPLING INFORMATION (continued)

C. PHOTOS

1. TYPE OF PHOTOS: [X] a. GROUND [ ] b. AERIAL
2. PHOTOS IN CUSTODY OF: Tom Runyon

D. SITE MAPPED?

[X] YES. SPECIFY LOCATION OF MAPS: Southeast quad. map of Memphis (Epic Site 96Ave)

E. COORDINATES

1. LATITUDE (deg.-min.-sec.): 35° 03' 04" N
2. LONGITUDE (deg.-min.-sec.): -89° 58' 26" W

V. SITE INFORMATION

A. SITE STATUS

[X] 1. ACTIVE (Those industrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if intermittently.)
[ ] 2. INACTIVE (Those sites which no longer receive wastes.)
[ ] 3. OTHER (specify): _____ (Those sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.)

B. IS GENERATOR ON SITE?

[X] 1. NO [ ] 2. YES (specify generator's four-digit SIC Code): _____

C. AREA OF SITE (in acres)

0.5 acre

D. ARE THERE BUILDINGS ON THE SITE?

[ ] 1. NO [X] 2. YES (specify): storage bldgs

VI. CHARACTERIZATION OF SITE ACTIVITY

Indicate the major site activity(ies) and details relating to each activity by marking 'X' in the appropriate boxes.

X	A. TRANSPORTER	X	B. STORER	X	C. TREATER	X	D. DISPOSER
	1. RAIL	X	1. PILE		1. FILTRATION		1. LANDFILL
	2. SHIP		2. SURFACE IMPOUNDMENT		2. INCINERATION		2. LANDFARM
	3. BARGE	X	3. DRUMS		3. VOLUME REDUCTION		3. OPEN DUMP
	4. TRUCK	X	4. TANK, ABOVE GROUND		4. RECYCLING/RECOVERY		4. SURFACE IMPOUNDMENT
	5. PIPELINE		5. TANK, BELOW GROUND		5. CHEM./PHYS./TREATMENT		5. MIDNIGHT DUMPING
	6. OTHER (specify):		6. OTHER (specify): also water wagon used to haul water around airport site		6. BIOLOGICAL TREATMENT		6. INCINERATION
					7. WASTE OIL REPROCESSING		7. UNDERGROUND INJECTION
					8. SOLVENT RECOVERY		8. OTHER (specify):
					9. OTHER (specify):		

E. SUPPLEMENTAL REPORTS: If the site falls within any of the categories listed below, Supplemental Reports must be completed. Indicate which Supplemental Reports you have filled out and attached to this for..

[ ] 1. STORAGE [ ] 2. INCINERATION [ ] 3. LANDFILL [ ] 4. SURFACE IMPOUNDMENT [ ] 5. DEEP WELL
[ ] 6. CHEM/BIO/PHYS TREATMENT [ ] 7. LANDFARM [ ] 8. OPEN DUMP [ ] 9. TRANSPORTER [ ] 10. RECYCLOR/RECLAIMER

VII. WASTE RELATED INFORMATION

A. WASTE TYPE

[ ] 1. LIQUID [X] 2. SOLID [ ] 3. SLUDGE [ ] 4. GAS

B. WASTE CHARACTERISTICS

[ ] 1. CORROSIVE [X] 2. IGNITABLE [ ] 3. RADIOACTIVE [ ] 4. HIGHLY VOLATILE
[ ] 5. TOXIC [ ] 6. REACTIVE [ ] 7. INERT [ ] 8. FLAMMABLE
[ ] 9. OTHER (specify): this materials are really not waste, but only in storage (fuel oil)

C. WASTE CATEGORIES

1. Are records of wastes available? Specify items such as manifests, inventories, etc. below.

Continued From Front

VII. WASTE RELATED INFORMATION *(continued)*

2. Estimate the amount *(specify unit of measure)* of waste by category; mark 'X' to indicate which wastes are present.

a. SLUDGE	b. OIL	c. SOLVENTS	d. CHEMICALS	e. SOLIDS	f. OTHER
AMOUNT	AMOUNT	AMOUNT	AMOUNT	AMOUNT	AMOUNT
UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE
X (1) PAINT, PIGMENTS	X (1) OILY WASTES	X (1) HALOGENATED SOLVENTS	X (1) ACIDS	X (1) FLYASH	X (1) LABORATORY, PHARMACEUT.
(2) METALS SLUDGES	(2) OTHER *(specify)*:	(2) NON-HALOGNTD. SOLVENTS	(2) PICKLING LIQUORS	(2) ASBESTOS	(2) HOSPITAL
(3) POTW		(3) OTHER *(specify)*:	(3) CAUSTICS	(3) MILLING/MINE TAILINGS	(3) RADIOACTIVE
(4) ALUMINUM SLUDGE			(4) PESTICIDES	(4) FERROUS SMELTING WASTES	(4) MUNICIPAL
(5) OTHER *(specify)*:			(5) DYES/INKS	(5) NON-FERROUS SMLTG. WASTES	(5) OTHER *(specify)*:
			(6) CYANIDE	(6) OTHER *(specify)*:	
			(7) PHENOLS		
			(8) HALOGENS		
			(9) PCB		
			(10) METALS		
			(11) OTHER *(specify)*:		

D. LIST SUBSTANCES OF GREATEST CONCERN WHICH ARE ON THE SITE *(place in descending order of hazard)*

1. SUBSTANCE	2. FORM *(mark 'X')*			3. TOXICITY *(mark 'X')*				4. CAS NUMBER	5. AMOUNT	6. UNIT
	a. SOLID	b. LIQ.	c. VAPOR	a. HIGH	b. MED.	c. LOW	d. NONE			

VIII. HAZARD DESCRIPTION

FIELD EVALUATION HAZARD DESCRIPTION: Place an 'X' in the box to indicate that the listed hazard exists. Describe the hazard in the space provided.

☐ A. HUMAN HEALTH HAZARDS

Continued From Page 4

VIII. HAZARD DESCRIPTION *(continued)*

☐ B. NON-WORKER INJURY/EXPOSURE

☐ C. WORKER INJURY/EXPOSURE

☐ D. CONTAMINATION OF WATER SUPPLY

☐ E. CONTAMINATION OF FOOD CHAIN

☐ F. CONTAMINATION OF GROUND WATER

☐ G. CONTAMINATION OF SURFACE WATER

Continued From Front

VIII. HAZARD DESCRIPTION (continued)

☐ H. DAMAGE TO FLORA/FAUNA

☐ I. FISH KILL

☐ J. CONTAMINATION OF AIR

☐ K. NOTICEABLE ODORS

☒ L. CONTAMINATION OF SOIL

Some spillage of fuel & oils on ground around drums, stopping upkeep, storage, and transfer of mid sized drums

☐ M. PROPERTY DAMAGE

Continued From Page 6

VIII. HAZARD DESCRIPTION (continued)

[X] N. FIRE OR EXPLOSION

Possibility of fire from ~~storage of~~ storage of fuel, motor oil & lube oils stored on site.

[X] O. SPILLS/LEAKING CONTAINERS/RUNOFF/STANDING LIQUID

Some spillage of fuel & oils on ground around drums. Drums not stored on concrete pads.

[ ] P. SEWER, STORM DRAIN PROBLEMS

[ ] Q. EROSION PROBLEMS

[ ] R. INADEQUATE SECURITY

[ ] S. INCOMPATIBLE WASTES

Continue On Reverse

VIII. HAZARD DESCRIPTION (continued)

☐ T. MIDNIGHT DUMPING

☐ U. OTHER (specify):

Some drums ~~stored~~ stored on site contained Run-way de-icers.
Few 55 gallon drums empty stored on site
Reels of Cable & old light poles stored on site.
5 gallon containers of expansion mtl used in cracks in runway
Few 5 gallon containers of tar (used to help fill cracks in runways)
Gravel & Sand stored on site.
This area was used as storage site for materials used in
maitance and up ~~kept~~ of runways, and airport grounds

IX. POPULATION DIRECTLY AFFECTED BY SITE

A. LOCATION OF POPULATION	B. APPROX. NO. OF PEOPLE AFFECTED	C. APPROX. NO. OF PEOPLE AFFECTED WITHIN UNIT AREA	D. APPROX. NO. OF BUILDINGS AFFECTED	E. DISTANCE TO SITE (specify units)
1. IN RESIDENTIAL AREAS				
2. IN COMMERCIAL OR INDUSTRIAL AREAS				
3. IN PUBLICLY TRAVELLED AREAS				
4. PUBLIC USE AREAS (parks, schools, etc.)				

X. WATER AND HYDROLOGICAL DATA

A. DEPTH TO GROUNDWATER (specify unit)	B. DIRECTION OF FLOW	C. GROUNDWATER USE IN VICINITY
D. POTENTIAL YIELD OF AQUIFER	E. DISTANCE TO DRINKING WATER SUPPLY (specify unit of measure)	F. DIRECTION TO DRINKING WATER SUPPLY

G. TYPE OF DRINKING WATER SUPPLY

☐ 1. NON-COMMUNITY < 15 CONNECTIONS ☐ 2. COMMUNITY (specify town): > 15 CONNECTIONS _____

☐ 3. SURFACE WATER ☐ 4. WELL

Continue On Page 9

Continued From Page 8

X. WATER AND HYDROLOGICAL DATA (continued)

H. LIST ALL DRINKING WATER WELLS WITHIN A 1/4 MILE RADIUS OF SITE

1. WELL	2. DEPTH (specify unit)	3. LOCATION (proximity to population/buildings)	4. NON-COMMUNITY (mark 'X')	5. COMMUNITY (mark 'X')

I. RECEIVING WATER

1. NAME

☐ 2. SEWERS ☐ 3. STREAMS/RIVERS

☐ 4. LAKES/RESERVOIRS ☐ 5. OTHER (specify)

6. SPECIFY USE AND CLASSIFICATION OF RECEIVING WATERS

XI. SOIL AND VEGITATION DATA

LOCATION OF SITE IS IN:

☐ A. KNOWN FAULT ZONE ☐ B. KARST ZONE ☐ C. 100 YEAR FLOOD[illegible] ☐ D. WETLAND

☐ E. A REGULATED FLOODWAY ☐ F. CRITICAL HABITAT ☐ G. RECHARGE ZO[illegible] [illegible] AQUIFER

XII. TYPE OF GEOLOGICAL MATERIAL OBSERVED

Mark 'X' to indicate the type(s) of geological material observed and specify where necessary [illegible] parts.

'X'	A. OVERBURDEN	'X'	B. BEDROCK (specify below)	X'	[illegible] (specify below)
	1. SAND				
	2. CLAY				
	3. GRAVEL				

XIII. SOIL PERMEABILITY

☐ A. UNKNOWN ☐ B. VERY HIGH (100,000 to 1000 cm/sec.) ☐ [illegible] cm/sec.)

☐ D. MODERATE (10 to .1 cm/sec.) ☐ E. LOW (.1 to .001 cm/sec.) ☐ [illegible] .1 to .00001 cm/sec.)

G. RECHARGE AREA

☐ 1. YES ☐ 2. NO 3. COMMENTS:

H. DISCHARGE AREA

☐ 1. YES ☐ 2. NO 3. COMMENTS:

I. SLOPE

1. ESTIMATE % OF SLOPE

2. SPECIFY DIRECTION OF SLOPE, CONDITION OF SLOPE, ETC.

J. OTHER GEOLOGICAL DATA

Continued From Front

XIV. PERMIT INFORMATION

List all applicable permits held by the site and provide the related information.

A. PERMIT TYPE (e.g., RCRA, State, NPDES, etc.)	B. ISSUING AGENCY	C. PERMIT NUMBER	D. DATE ISSUED (mo., day, & yr.)	E. EXPIRATION DATE (mo., day, & yr.)	F. IN COMPLIANCE (mark 'X')		
					1. YES	2. NO	3. UNKNOWN

XV. PAST REGULATORY OR ENFORCEMENT ACTIONS

☐ NONE ☐ YES *(summarize in this space)*

NOTE: Based on the information in Sections III through XV, fill out the Tentative Disposition *(Section II)* information on the first page of this form.

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

EPA

I. IDENTIFICATION
01 STATE: TN | 02 SITE NUMBER: TND 980728034

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
Memphis Airport Storage Area SEA-9	Winchester

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Memphis	TN	38138	Shelby	157	08

09 COORDINATES LATITUDE	LONGITUDE
35 03 24.N	89 58 26.W

10 DIRECTIONS TO SITE (Starting from nearest public road):

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)
Memphis Airport Authority	Winchester

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Memphis	TN	38138	( )

07 OPERATOR (If known and different from owner)	08 STREET (Business, mailing, residential)
SAME	

09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
			( )

13 TYPE OF OWNERSHIP (Check one)
☐ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☒ E. MUNICIPAL
☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☐ A. RCRA 3001 DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☒ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☒ YES ☐ NO DATE 8/19/80 (MONTH DAY YEAR)
BY (Check all that apply)
☒ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)
CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)
☒ A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION
_____ (BEGINNING YEAR) | _____ (ENDING YEAR) ☒ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED
runway deicers, fuel, tar, ect.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
This is a storage Area for various items used in maintenence of Airport facilities. In the 8/19/80 EPA SI Report some spillage was noted. Inspect if time allows. Storage Area - not disposal

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is assigned, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☒ C. LOW (Inspect on an annual basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBER
Chuck Graves	Airfield Mtnce Sup. Mfs Airport Auth.	(901) 345-7777

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
Michael L. Higgs	TN Dept of Health & Env.	Division of Solid Waste Management	(615) 741-6287	1 11 84 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
TN	D 980 728 034

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- ☐ C. SLUDGE
- ☐ D. OTHER _____ (Specify)
- ☐ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE

(Measures of waste quantities must be independent)

TONS _____

CUBIC YARDS _____

NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- ☐ A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☐ D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ☐ H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently used CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
7					

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sampling results, reports)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE: TN | 02 SITE NUMBER: TND980728034

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ A. GROUNDWATER CONTAMINATION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 ☐ B. SURFACE WATER CONTAMINATION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 ☐ C. CONTAMINATION OF AIR
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 ☐ E. DIRECT CONTACT
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 ☐ F. CONTAMINATION OF SOIL
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: _____ (Acres)
04 NARRATIVE DESCRIPTION

01 ☐ G. DRINKING WATER CONTAMINATION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 ☐ H. WORKER EXPOSURE/INJURY
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

01 ☐ I. POPULATION EXPOSURE/INJURY
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE: TN | 02 SITE NUMBER: D 980729034

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA
04 NARRATIVE DESCRIPTION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

01 ☐ K. DAMAGE TO FAUNA
04 NARRATIVE DESCRIPTION (Include names of species)
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

01 ☐ L. CONTAMINATION OF FOOD CHAIN
04 NARRATIVE DESCRIPTION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES
(Spills/runoff/standing liquids/leaking containers)
03 POPULATION POTENTIALLY AFFECTED: _____
04 NARRATIVE DESCRIPTION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

01 ☐ N. DAMAGE TO OFFSITE PROPERTY
04 NARRATIVE DESCRIPTION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs
04 NARRATIVE DESCRIPTION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

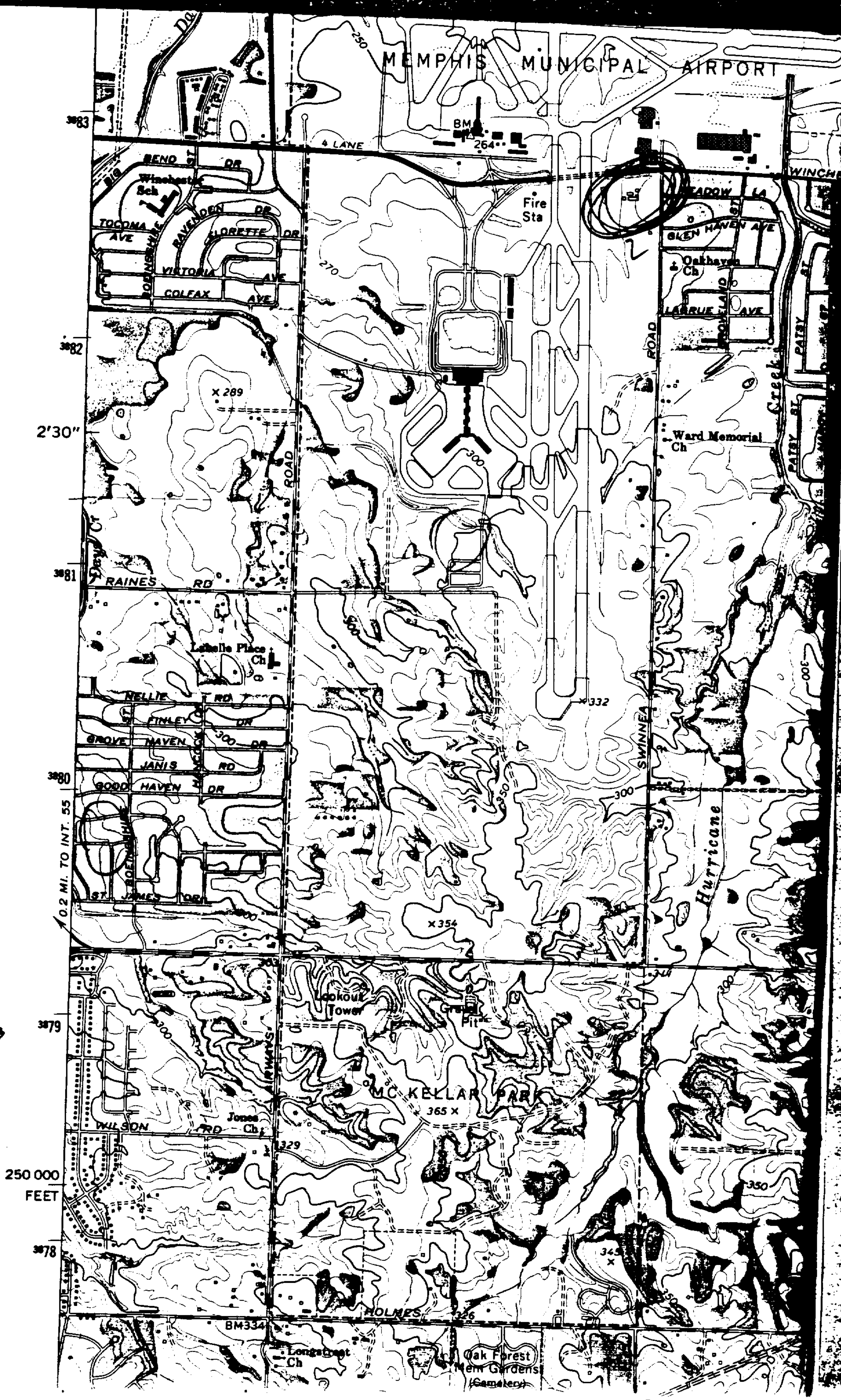
01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING
04 NARRATIVE DESCRIPTION
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)


MEMPHIS MUNICIPAL AIRPORT
3883
3882
3881
3880
3879
3878
2'30"
250 000
FEET
4 LANE
BM
264
Fire
Sta
BEND
DR
Winchester
Sch
RAVENDEN
TOCOMA
AVE
LORETTE
VICTORIA
COLFAX
GLEN HAVEN AVE
MEADOW
LA
Oakhaven
Ch
LARUE
AVE
PATSY
ST
ROAD
Ward Memorial
Ch
Creek
x 289
300
270
250
RAINES
RD
LaBelle Place
Ch
NELLIE
FINLEY
DR
GROVE
HAVEN
JANIS
GOOD
HAVEN
x 332
SWINNEA
0.2 MI. TO INT. 55
ST
JAMES
x 354
Hurricane
Lookout
Tower
Gravel
Pit
AIRWAYS
MC KELLAR PARK
365 x
WILSON
RD
Jones
Ch
329
350
345
HOLMES
326
BM334
Longstreet
Ch
Oak Forest
Mem Gardens
(Cemetery)

Shelby Dr.